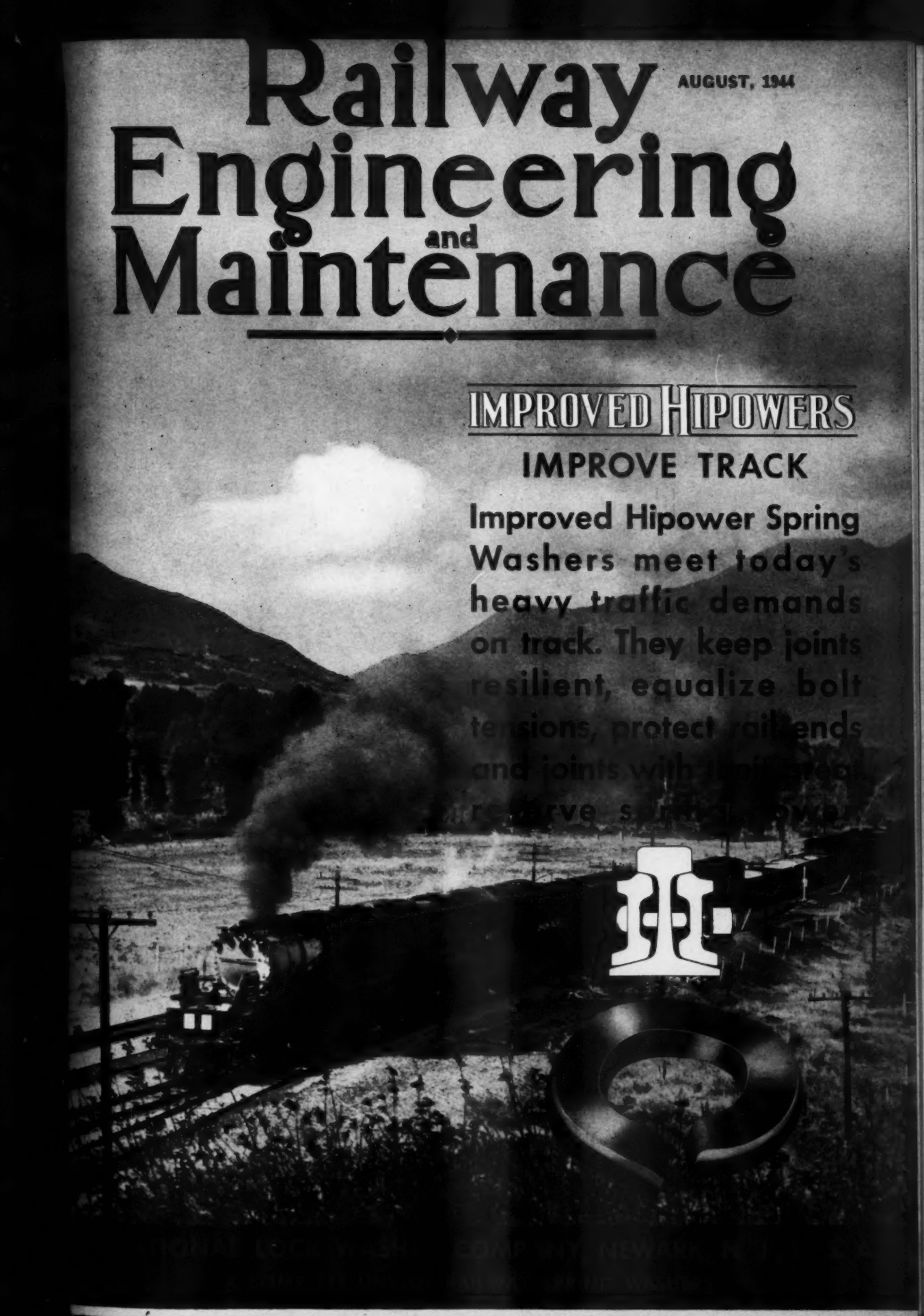
Railway Engineering and Maintenance

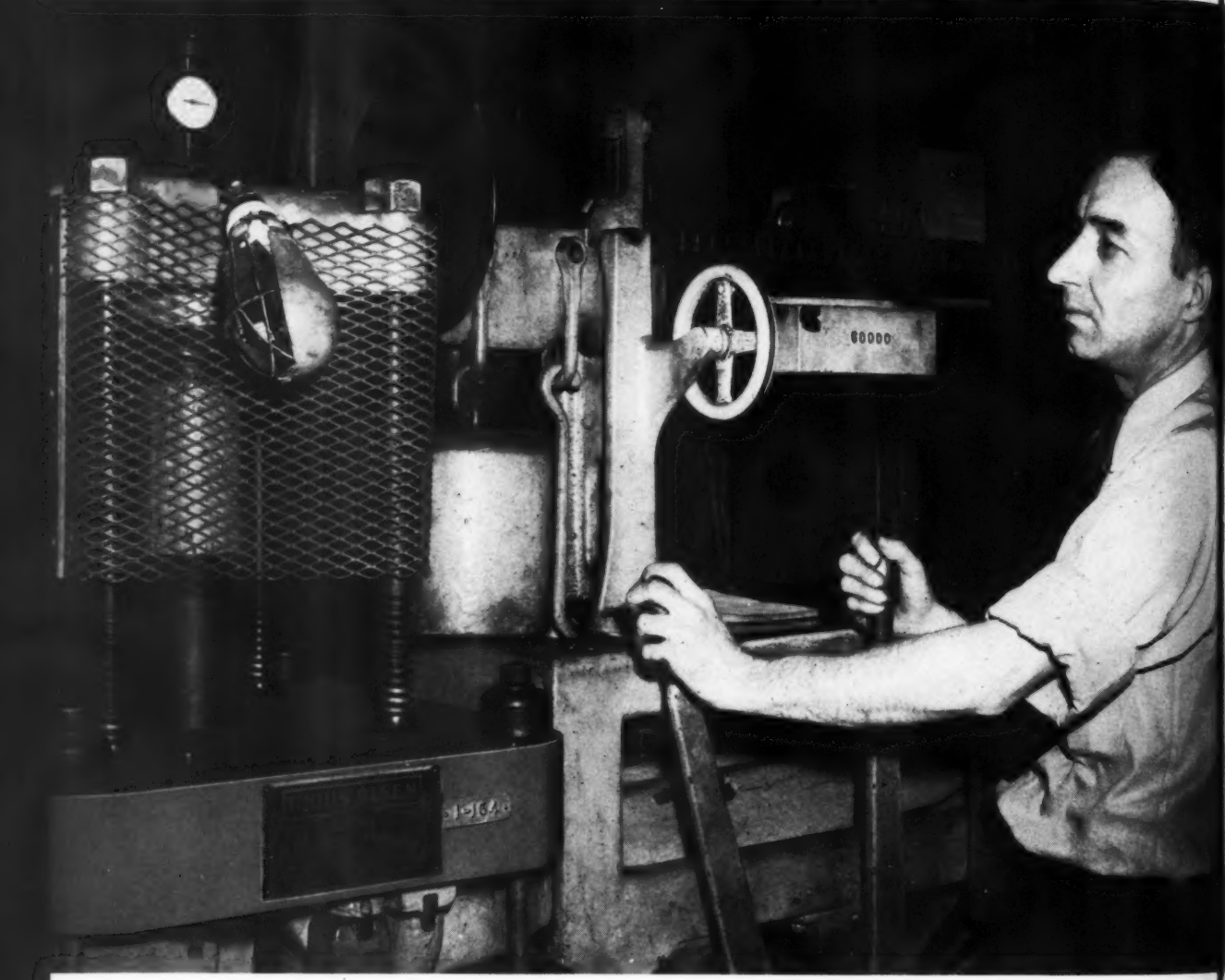
AUGUST, 1944

IMPROVED HIPOWERS
IMPROVE TRACK
Improved Hipower Spring Washers meet today's heavy traffic demands on track. They keep joints resilient, equalize bolt tensions, protect rail ends and joints with [illegible] reserve spring power.

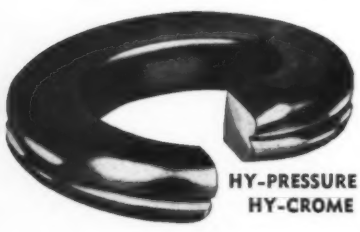


Reliance **HY-CROME** *Spring Washers*

ACTUAL TESTS *Develop* THE BEST



"Edgemark of Quality"



HY-PRESSURE HY-CROME

Developing the desirable features of a product is the duty of any testing laboratory—discovering its weak points is more important. The use of information from field and service tests is the basis for research work.

Weak points are thus strengthened and desirable features improved. The testing engineer's patient and persistent experiments pave the way for fabricating a better product and provide improved serviceability.

Continuously striving for improvement in **HY-CROME SPRING WASHERS** to meet new service demands as they arise we developed various members of the **HY-CROME** family—all milestones of **HY-CROME SPRING WASHER** progress.

STANDARD HY-CROME HY-PRESSURE HY-CROME HY-CROME PRESSURE SPRING HY-CROME SPRINGLOX DOUBLE HY-CROME HY-REACTION HY-CROME CROSSING HY-CROME LOCOMOTIVE HY-CROME

EATON MANUFACTURING CO. **RELIANCE SPRING WASHER DIVISION,** MASSILLON, OHIO

Sales Offices: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal

2 STANDOUTS for today's traffic

New Century Switch Stand

The New Century Switch Stand has had a long career. First manufactured more than 50 years ago, it has met the needs of American railroads with very few changes in basic design—evidence of its soundness and durability. Some New Centuries still in use were first placed in service 25, 30, or 35 years ago.

The counterweighted throwing lever of the New Century operates parallel to the rail. This switch stand is featured by ease of installation and maintenance, and all parts are interchangeable with the corresponding parts of older models.

The New Century is recommended for use with heavy rail at all points on main lines and branch lines, and in yards.

Bethlehem Hook Flange Guard Rail

Here's a guard rail that's virtually foolproof. The hook flange fits under the running rail in such a way that the weight of the train keeps the guard rail from overturning, regardless of side thrust. Moreover, the device is so constructed that a cushioning action results as the wheels are aligned passing the frog point, thus minimizing the danger of chipped or cracked wheels. Many installations have given 15 to 20 years of continuous service life.

The Hook Flange Guard Rail is bolted to special tie plates equipped with heavy shoulders—a positive aid to alignment.

Install this guard rail at points of heaviest service. It's built to take a beating.

Other Bethlehem Products for the Railroads

ALLOY STEELS
MAYARI R
(high-strength, low-alloy steel)
TOOL STEELS
FROGS—CROSSINGS
RAIL ANCHORS—RAIL BRACES
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LOCOMOTIVE FORGINGS
BOILER AND FIREBOX PLATES
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BRIDGES
TRANSMISSION TOWERS

★ ★ ★ BETHLEHEM STEEL ★ ★ ★

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Here they are . . . two new P&H electrodes — which perform equally well on either AC or DC!

Thoroughly proved in a wide variety of work, these remarkable new electrodes deliver an arc that is extremely stable, easily controlled and produces fine, uniformly strong welds.

You've waited for this . . . to simplify your welding problems — to make your electrode buying easier . . . to save time and money. Convince yourself—on your own welding jobs — that they are a practical answer to better welding at lower costs.

Place a trial order *today!*

AC-1 (E-6010 and E-6011)

For AC, and either polarity on DC. • Tensile strength, 65,000-70,000 P.S.I. • Yield, 55,000-60,000 P.S.I. • Ductility, (2"), 25% to 35%. • Available in all sizes — 14" and 18" lengths.

Conforms to requirements of: U. S. Navy Bureau of Ships specifications 46-E-3 Grade 3, Class 1, 2 and 3. • Hartford Steam Boiler and Insurance Company. • American Bureau of Shipping. • Lloyds Register of Shipping.

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extra qualities

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Ten pounds of Spike Maul from Warren Tool's famous Devil Line—the Slug Devil Double Duty Pittsburgh (Bell) Pattern Spike Maul.

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Now with the man power and material shortage confronting you at the same time as extra tonnage travels over your road, Devil tools will do their small bit in keeping more of your men on the job to do more work per day, with greater safety.

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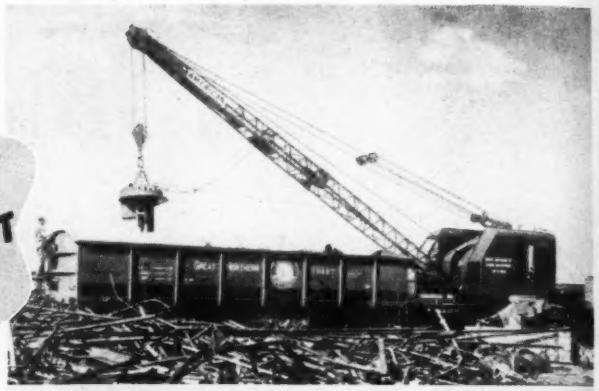
THE *American* LOCOMOTIVE CRANE A MATERIALS HANDLING METHOD FOR RAILROADS

with **MAGNET**



Handling track fastenings, spikes, bolts; picks up scrap or loads it into cars; loading and unloading rails.

with **BUCKET**
CLAMSHELL
ORANGE PEEL
DRAGLINE

Loading and unloading bulk materials; excavating for substructures of masonry work; performing various operations in grading; backfilling about foundations; filling sewer excavations; removing cinders from pits to cars or storage piles; handling ties with grapple in treating plants.

with **HOOK**
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or
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Handles timbers, ties, piles, track structures, rails, wheels and axles; used for raising and shifting track; erecting steel structures, and unloading smaller fabricated structures from cars into place.

Now is the time to look to improving your materials handling methods.

4438

Plan now . . . but wait for **AMERICAN!**

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Wherever wire rope is fastened . . . . use genuine **CROSBY CLIPS** *with the Red-U-Bolt*

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OXYGEN guaranteed 99.5% pure . . . assures maximum speed and economy in cutting, and greater efficiency in welding.

ACETYLENE proved by use and test to be the most economical fuel gas for oxyacetylene welding and other flame applications.

NITROGEN dry and inert, contains less than 0.3% oxygen. Also available at higher purity to meet specialized needs.

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Wartime construction has proved the case for heavy timber.

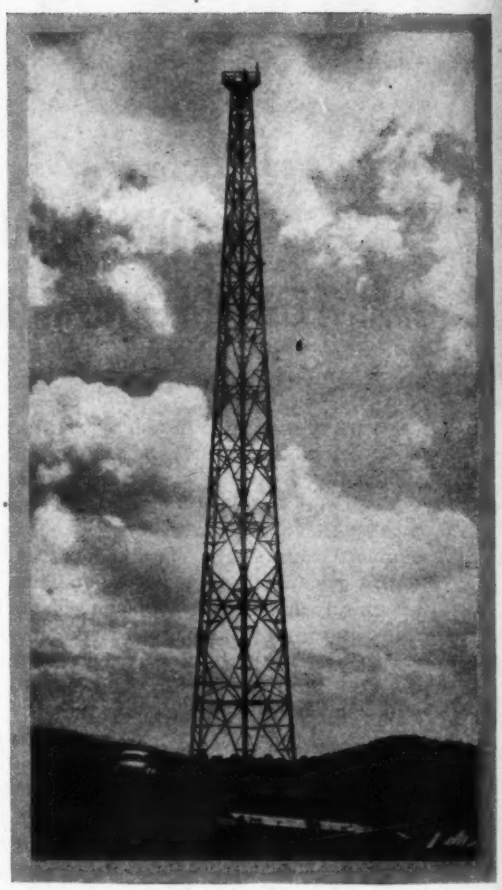
Planners of peacetime projects should study recent accomplishments in heavy-duty timber construction which would have seemed impossible a few years ago.

Many heretofore perplexing problems in design and engineering have been simplified by the TECO connector system of timber construction.

Here at TECO headquarters is a vast amount of data, typical designs, specifications, photographs, and all the "know-how" that would require years to assemble in your office.

All of this material, as well as the TECO engineers are at your service.

Experienced nation-wide timber fabricators with large productive capacity have produced thousands of large and small war jobs using the TECO connector system of timber construction. They continue to turn out timber structures on time. They too, can help you.



250' free standing wood tower built recently in the United States. Designed, fabricated and erected by Cartwright and Morrison, Holcomb, N. Y.

TIMBER ENGINEERING COMPANY

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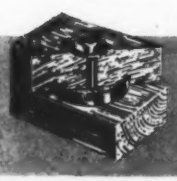
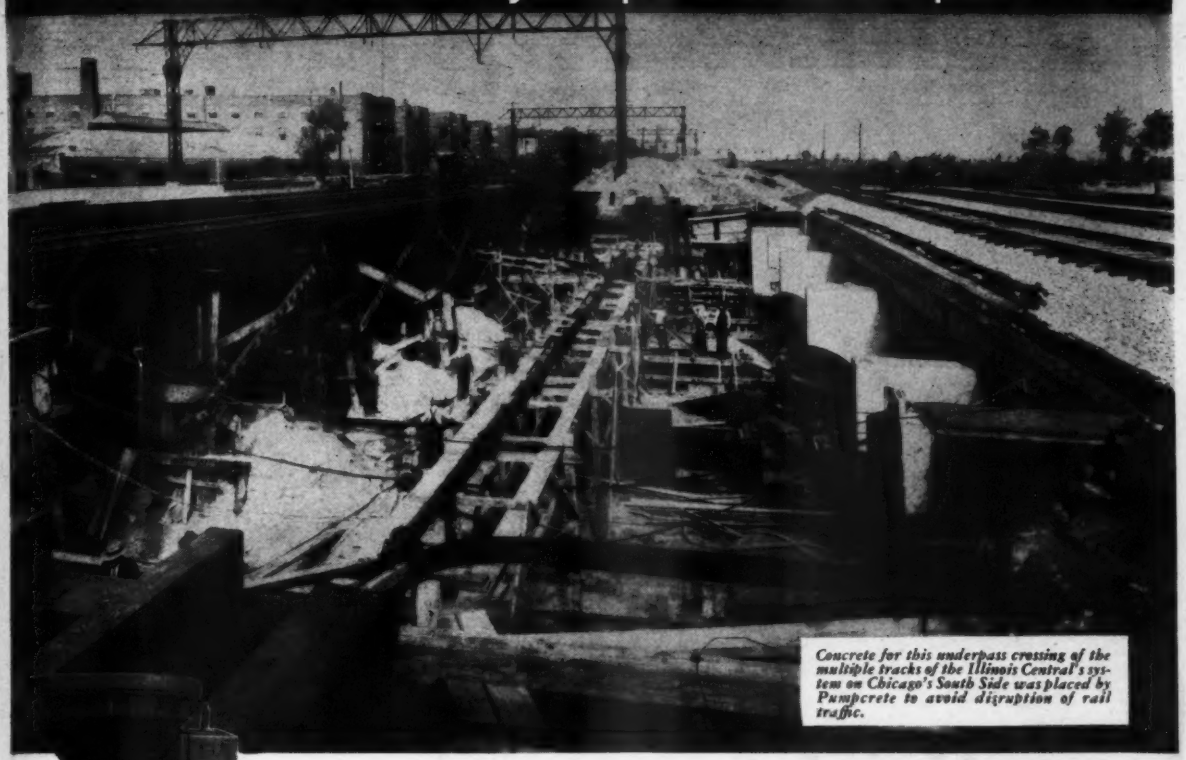


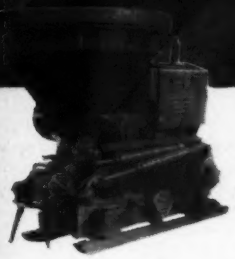
Specify **TECO CONNECTORS AND TOOLS**

Endorsed by Leading Lumber Manufacturers and Fabricators

...eliminate traffic delays...speed concrete placement



Concrete for this underpass crossing of the multiple tracks of the Illinois Central's system on Chicago's South Side was placed by Pumpcrete to avoid disruption of rail traffic.



...WITH PUMPCRETE

PUMPCRETE, the pump that pumps concrete through a pipe line, takes concrete placement out of the "lift and carry" method, makes it a simple pump and pipe line operation.

Regardless of the size of the job—culverts, underpasses, bridges, tunnels, snowsheds or station work—Rex Pumpcrete cuts concrete placing time and cost . . . permits more orderly, economical job progress. The Pumpcrete eliminates the necessity for erecting structures that might delay rolling stock. It simplifies placement on difficult jobs, for the Pumpcrete can pump concrete a horizontal distance of 1,200 feet or a vertical distance of 120 feet.

Proved on every type of concrete job, the Rex Pumpcrete is rapidly becoming the outstanding tool of the concrete construction industry.

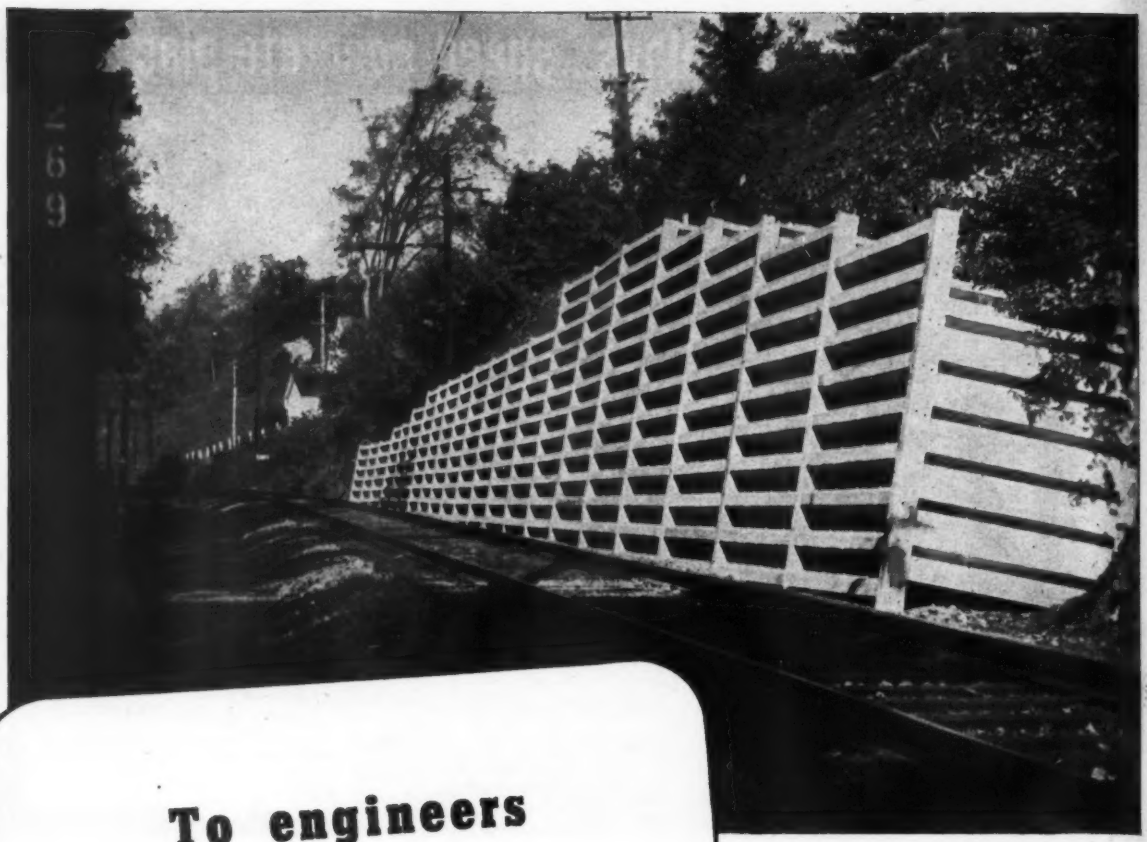
SEND FOR THIS FREE BOOKLET

Whatever you want to know about the Rex Pumpcrete, this free book can tell you. Its 24 pages tell the complete story of the Pumpcrete . . . what it is and what it does. It gives you complete specifications and engineering information and many interesting installation illustrations. Send for your free copy today. Write Chain Belt Company, 1601 West Bruce Street, Milwaukee 4, Wisconsin.

REX

CONSTRUCTION MACHINERY

PUMPS PAVERS PUMPCRETES MOTO-MIXERS MIXERS



Space was at a premium for widening a highway above this railroad cut. The answer was an ARMCO *Bin-Type Retaining Wall to prevent encroachment of the slope upon the tracks.*

To engineers who are planning the "BATTLE OF PEACE"

America will need your plans. Millions of fighting men and other millions of war workers must some day turn to new jobs in a new and different world. You can help by planning now to avert a serious let-down when Victory is won.

No doubt you are thinking about many projects that would not only improve your roadbed, but even more important would provide jobs for returning service men and workers now in war industries. Even now industry is planning postwar developments to absorb its share of these people. If the railroads of this country also have their reconstruction plans ready, employment will be less of a problem to America.

In this "board work" you may need a practical solution for unstable slopes, rights-of-way and similar problems. Remember ARMCO Bin-Type Walls for their ability to overcome unequal settlement without cracking or bulging.

So include ARMCO Walls in your plans for the future even though you can't get them for immediate construction. Right now tanks, guns and ships are most important. Armco Railroad Sales Co. Inc., 2281 Curtis Street, Middletown, Ohio.

EXPORT: THE ARMCO INTERNATIONAL CORPORATION

ARMCO Bin-Type RETAINING WALLS

Fairbanks-Morse Helps Meet Wartime Schedules

with Sheffield

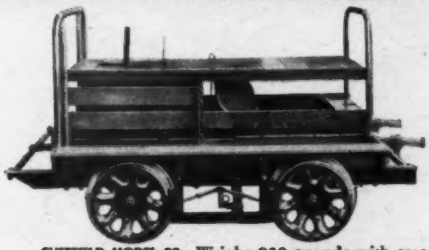
MOTOR CARS

THERE is no industry facing problems more critical than those of the railroad industry.

They are problems that call for equipment and more equipment—to help meet the tremendous maintenance programs—the manpower shortages—and the greatest traffic peaks in railroad history.

It must be good equipment—reliable equipment that will help save time and labor—enable railroads to operate safely in the fastest possible time.

FIRST ON THE RAILS ••• AND STILL FIRST

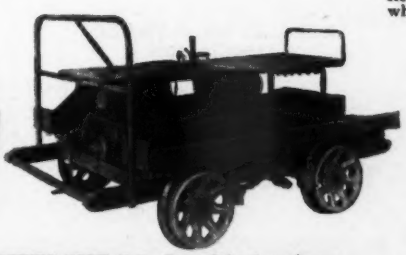


SHEFFIELD MODEL 53—Weighs 930 pounds with rear-end lift of only 125 pounds. Has 8- to 13-hp. water-cooled engine. Chain drive. Steel frame, toe boards and tray ends. Differential front axle. Self-centering metal faced brakes. Rail skids.

SHEFFIELD MODEL 709—Lightweight standard section car similar to Model 53, but with belt drive.

SHEFFIELD MODEL 57—One man patrol, maintainers and inspection car, 9-hp. Belt or roller chain drive. Resilient insulating wood center wheels—no steel wheel clang.

SHEFFIELD MODEL 44-S—The standard section car on many railroads. Sturdy, roomy. Weighs 1095 pounds. Has ample power to haul trailers loaded with men, tools or ties. Water-cooled 8- to 13-hp. engine with air-cooled head. Chain drive.



SHEFFIELD MODEL 40-S—One of the finest heavy-duty motor cars on rails. Has powerful engine—weighs 1235 pounds—ample room for section gangs. Has four speeds forward and reverse, with more than enough power to haul trailers.

SHEFFIELD MODEL 85—Lightweight, full-sized section car, weight 700 pounds. Rear lifting weight only 100 pounds. Air-cooled 8-hp. engine, chain drive, with self-centering brakes.

FAIRBANKS, MORSE & CO.

FAIRBANKS-MORSE BUILDING, CHICAGO 5, ILLINOIS

MEMBER 1944

Canadian Fairbanks-Morse Co., Ltd., Montreal

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— the subflooring grade of Douglas fir plywood —

HELPS YOU LAY A BETTER FLOOR— AND DO IT FASTER!

Plyscord offers many distinct advantages to the flooring contractor. It speeds work because the big 4x8 foot panels go down faster—at least twice as fast as the conventional board sheathing. It saves up to 60% on sawing, fitting and jointing—up to 50% on nailing costs.

Nails can be driven right at the edge of a panel, too, without danger of splitting. And the laminated construction of Plyscord means that nails won't pull out or work loose.

The subfloor is STRONGER with Plyscord: at least 40% more rigid than diagonally-laid shiplap. It provides a firm smooth surface that speeds laying of the finish floor—eliminating the danger of cupping, warping, squeaking or shrinking.

Hard or soft wood flooring may be laid right over Plyscord subflooring.

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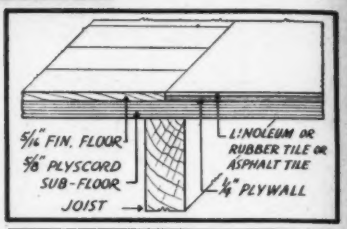
*Plywall is the wallboard grade of Douglas fir plywood, as defined in U. S. Commercial Standard CS 45-42. The grade-mark appears on the back of every panel.

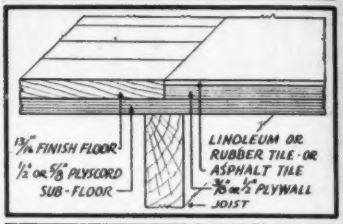
For linoleum, tile and other resilient materials, an intermediate base of 1/4" "sound-one-side" Plywall* is recommended. The smooth, faultless panels of Plywall provide a backing free of board marks or other imperfections. Specify both Plyscord and Plywall by name—and identiy them easily by the "grade trade-mark" on every panel. Plan to use both of these grades of Douglas fir plywood on your post-war contracts. And for more information now, write:

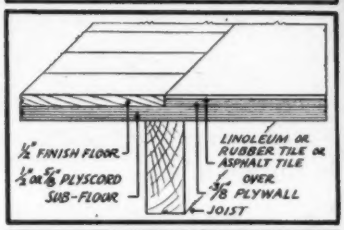
DOUGLAS FIR PLYWOOD ASSOCIATION
Tacoma 2, Washington

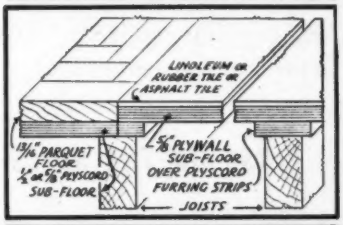
Because of its many advantages Douglas fir plywood today serves the war effort exclusively. When it is no longer so urgently needed for essential uses, it will again serve you in countless new ways.

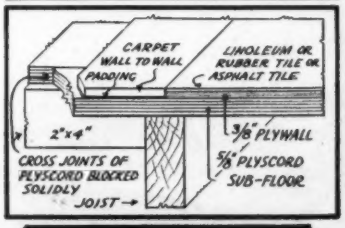
DETAILS FOR JOINING TWO TYPES OF FINISH FLOORING OVER PLYWOOD.

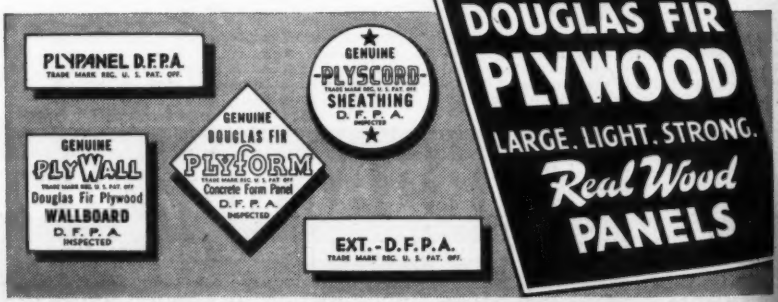







LINOLEUM OR RUBBER TILE OR ASPHALT TILE
13/16" PARQUET FLOOR
1/2 OR 5/8" PLYSCORD SUB-FLOOR
5/8" PLYWALL SUB-FLOOR OVER PLYSCORD FURRING STRIPS
JOISTS

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Real Wood PANELS

SPECIFY DOUGLAS FIR PLYWOOD BY THESE "GRADE TRADE-MARKS"

TR RAIL DESIGN

TR Rail and Joint in track on the Burlington Railroad

For more information refer to feature editorial articles in the October 1943 Railway Engineering and Maintenance and the October 2, 1943 Railway Age.

Back the Invasions

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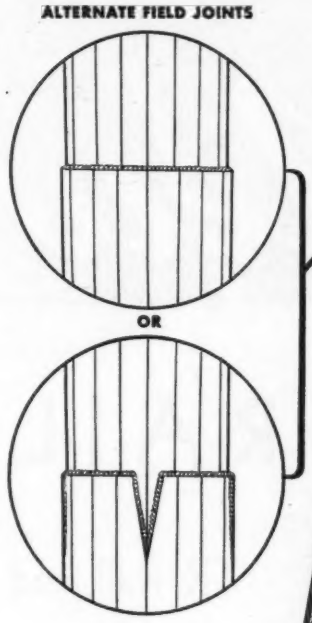
MONOTUBE Tapered Piles

...First in Foundations



MEN who are responsible for the swift completion of engineering and construction projects—highway and railway bridges, overpasses, buildings, and airports—prefer Monotube tapered steel piles for these four important reasons . . .

(1) ***Monotubes are easy to extend.*** Extendible Monotubes are available for the quick and economical installation of varying pile lengths even in low headroom. Diagram shows two alternate field joints that help make the job easy.

(2) ***Monotubes are simple to drive.*** They are so strong and rigid they require no heavy core or mandrel—can be driven with average job equipment.

(3) ***Monotubes can be handled with speed*** because of their light weight.

(4) ***Monotubes are quick to inspect.*** Their tubular design permits a thorough top-to-toe check after being driven to required bearing.

Available in a gauge, size, and taper to meet the most exacting requirements in all soil conditions.

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UNION METAL

Monotube Tapered Piles

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UNIT TYTAMPER

Only the most effective use of manpower has enabled American railways to maintain such high levels of service all through the war emergency. Barco Unit Tytampers have been one of the tools which have made that feat possible... low in operating cost... able to stand up in rugged service... absolutely portable, they have thoroughly established their right to leadership. Write for full information to: The Barco Manufacturing Company, Not Inc., 1805 Winnemac Avenue, Chicago 40, Illinois.

•

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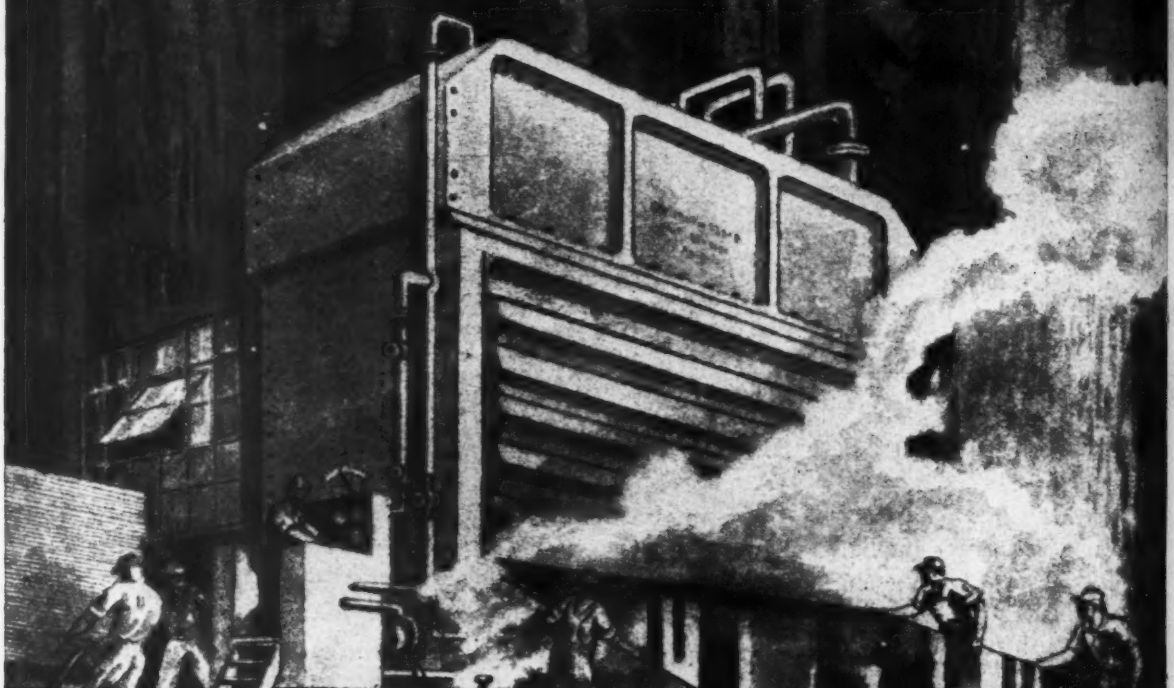
From the Douglas Fir Forests and the Plastics Industry comes a *NEW* tested material

INDERON

THE STABILIZED STRUCTURAL PRODUCT



What is INDERON?

INDERON is a new material, combining the advantages of two other proven materials —fir plywood and plastics. It is composed of three basic ingredients: strong, durable Douglas fir veneers, a plastic-impregnated fibrous film, and an internal adhesive of thermosetting resin. INDERON is neither a plywood nor a plastic. It is, in effect, an alloy which possesses the qualities of a true plastic at a cost comparable to finished plywood. It is manufactured in modern West Coast plywood plants, where Douglas fir veneers, phenolic adhesives and resin-impregnated paper are chemically united in high-heat, high-pressure presses.

What are the advantages of INDERON?

Because INDERON combines the best qualities of both plastic and plywood, it is available in larger sheets and can be produced cheaper than an ordinary plastic. Yet it is permanently insoluble and affords a marked resistance to chemical or mechanical destructive elements. In strength value it compares favorably with aluminum. It is dimensionally stable, inexpensive, easy to work, and requires no surface protection. In peacetime application it will be available in permanent colors, designs and patterns—all of which will be an integral part of the product itself!

How can you plan to use INDERON?

At present, INDERON is available only for Army-Navy uses. When it is no longer so urgently needed for war, INDERON will serve a wide range of uses in many industries. For example: INDERON is ideal for marine application. It will resist salt water, terrific strains, impact blows, abrasion, corrosive and toxic fumes. In the building field, INDERON will serve as roof, walls, floors and built-ins for tomorrow's homes. It will be applied to special packaging, to prefabrication, to furniture, to many another field.

Learn more about INDERON —Write NOW!

Buffelen Lumber & Mfg. Co.
Tacoma 1, Washington

Washington Veneer Co.
Olympia, Washington

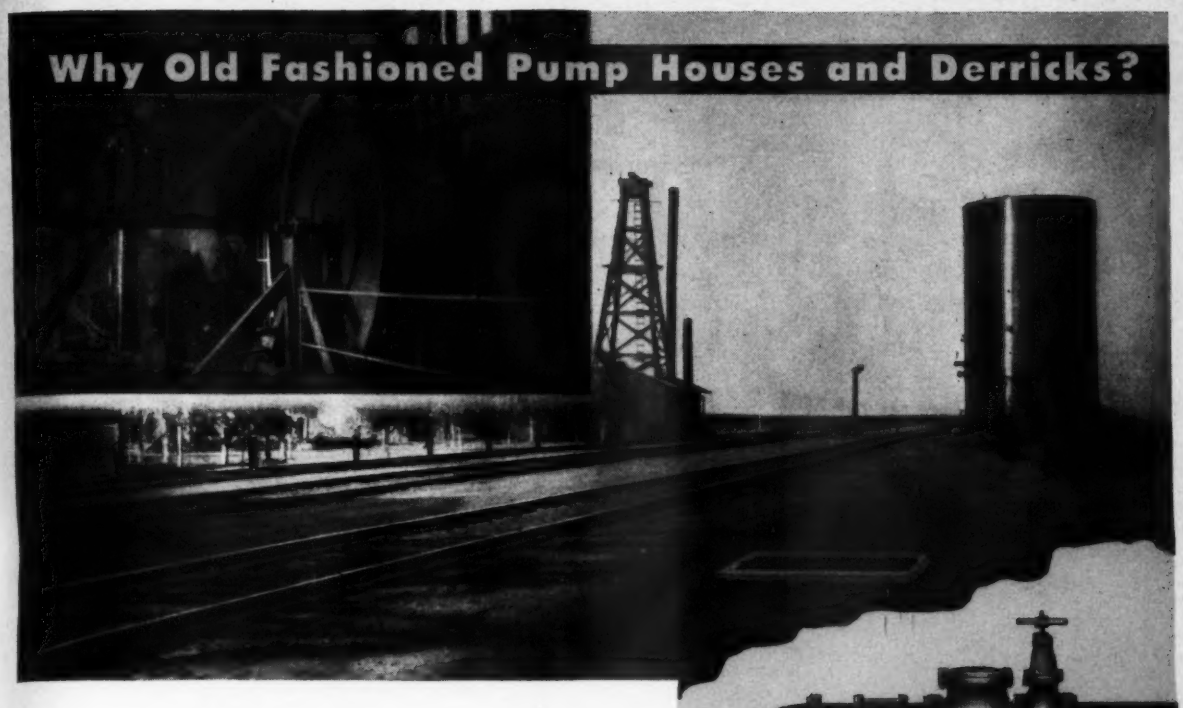
manufacturers

Chicago Sales Office:
9 So. Clinton St., Chicago 6

INDERON

THE *Stabilized* STRUCTURAL PRODUCT

Why Old Fashioned Pump Houses and Derricks?



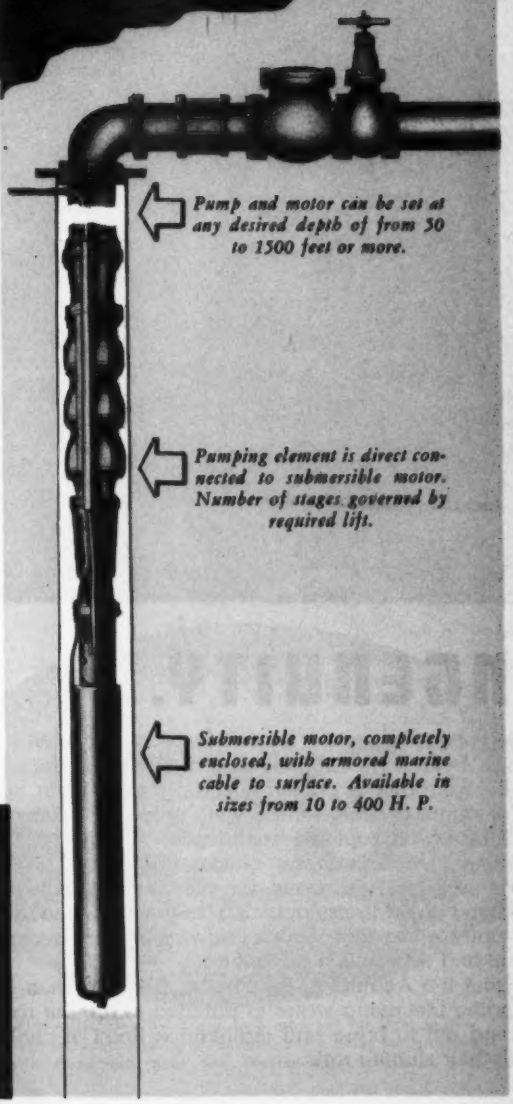
when YOU CAN HAVE BYRON JACKSON SUBMERSIBLE PUMPS

When you put in new pumps, plan to install both motors and pumps *at your water source,* regardless of location. Pump house is unnecessary.

Whatever or wherever the water source, there you can install a Byron Jackson Submersible—forgetting pump houses, complicated piping and valving, expensive care and maintenance. Only a manhole and a simple panel—both under lock and key—need mark the spot. Control can be operated from any distant point.

Long line shafts, cover tubes, bearings, lubrication, priming, exposed piping, valving, gages, etc., are eliminated, along with the pump house hazards of fire, theft, and sabotage. Instead, a marine cable follows delivery pipe down the well from the locked panel to the submerged motor directly connected to pump at water source.

With tried and proved service along railroads from coast to coast, the Submersible affords unusual opportunities as you plan now for increased water supply. Write us today for the Submersible Pump experience of other railroad lines.


Pump and motor can be set at any desired depth of from 50 to 1500 feet or more.
Pumping element is direct connected to submersible motor. Number of stages governed by required lift.
Submersible motor, completely enclosed, with armored marine cable to surface. Available in sizes from 10 to 400 H. P.

ARMY E NAVY

BYRON JACKSON CO.

Houston • LOS ANGELES • New York

SCALING THE SIERRA NEVADAS. Railway engineers met and ov quered great obstacles in crossing the Rockies, but tribute shou

INGENUITY...

The American genius for overcoming obstacles has nowhere been more gallantly displayed than in the building of the railroads. A chasm to span, a great river to cross, a mountain to scale—these were only a challenge, to be accepted with supreme confidence.

History records many outstanding feats as railroad engineers devised ways for piercing the Alleghenies, bridging the Mississippi, and negotiating the Rockies. Actually, every foot of track laid was a major accomplishment and an exciting adventure.

From the Atlantic to the Pacific, like irrigation ditches bringing life-giving water to parched earth, the railroads spread out to bring and maintain a flood of civilization with their shining rails.

The stability of American railroad engineering has n finer testimonial than the service rendered in wartim transportation. With schedules stepped up in speed an frequency, the capacity of the railroads to maintain thei stupendous task of moving men and materials, in quan tities heretofore considered impossible, is a glorious tribute to the sound basis upon which the roads were buil

Maintenance has played no lesser role. The incessan pounding of heavily loaded trains has proportionately enhanced the responsibility and work of maintenance.

That maintenance crews be swiftly and safely mobile has been Fairmont's contribution to the railroad wartim task. It is with deep gratification that Fairmont can point to the large number of Fairmont Railway Motor Cars i

OF ALL THE CARS IN SERVICE TODA

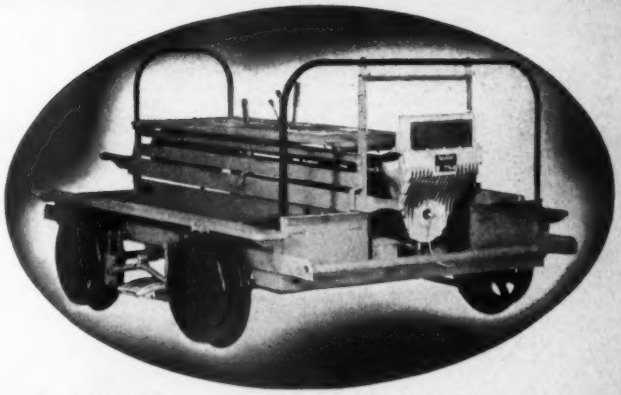
be accorded all the builders of our early railways. Their exploits constitute one of the most inspiring chapters in America's history..

operation, and their splendid record for endurance and efficiency. Their record, like that of the railroads, can be directly attributed to sound construction practices faithfully followed. Fairmont Railway Motors, Inc., Fairmont, Minnesota.

Fairmont

RAILWAY MOTOR CARS

Performance ON THE JOB COUNTS



M14 Series G—This is a 2 to 6 man car for light section work, including hauling of loaded trailers. May be equipped with two-speed gear for heavier duty. Bulletin 397.

. MORE THAN HALF ARE FAIRMONTS

Fast Service

Requires Good Track

Woolery Tie Cutters require only one man to operate. They saw the ties into three easily removed pieces leaving the tie bed undisturbed, eliminate trenching and reduce tamping to the minimum. They can also be used to saw off ends of ties so they will be of uniform length.

Woolery Weed Burners assure weed-free track because they effectively and swiftly destroy vegetation. Made in 5-burner, 3-burner, 2-burner and 1-burner models.

To provide those refinements in track maintenance comparable with the refinements in comfort found in its Blue Bird and Banner Blue trains, the Wabash employs Woolery Weed Burners to eliminate vegetation growth on its tracks and right-of-way.

Labor saving Woolery equipment can be put to work on your road to maintain track in the best possible condition during this period of strenuous use.

WOOLERY MACHINE COMPANY

MINNEAPOLIS — Pioneer Manufacturers of — MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

RAILWAY WEED BURNERS · MOTOR CARS · TIE CUTTERS · TIE SCORING MACHINES · RAIL JOINT OILERS · CREOSOTE SPRAYERS · BOLT TIGHTENERS

EXCLUSIVE EXPORT REPRESENTATIVES: PRESSED STEEL CAR COMPANY, INC., PITTSBURGH, PENNA.

AIR POWER and AIR TOOLS PRODUCE

MORE WORK Per Man Hour

With manpower an increasing problem, every consideration must be given to ways and means to utilize available crews and equipment to do an even greater maintenance job. Portable air power and lightweight air tools are a working combination that is helping to solve this problem.

Ingersoll-Rand "off-track" compressors produce the air power. They are readily portable and can operate many combinations of air tools. They do not interrupt the flow of traffic and keep up with the work as it progresses. I-R compressors are noted for their reliability and uninterrupted service on the job.

Ingersoll-Rand lightweight air tools reduce operator fatigue and speed up the work. This produces a better grade of maintenance which is necessary today with the record wear and tear on railway properties.

Ingersoll-Rand

11 Broadway, New York, N. Y.

ORIGINATOR OF MECHANICAL TAMPING

All plants of Ingersoll-Rand Company are flying the Army-Navy "E" awarded "for high achievement in the production of war materials."

The I-R Line

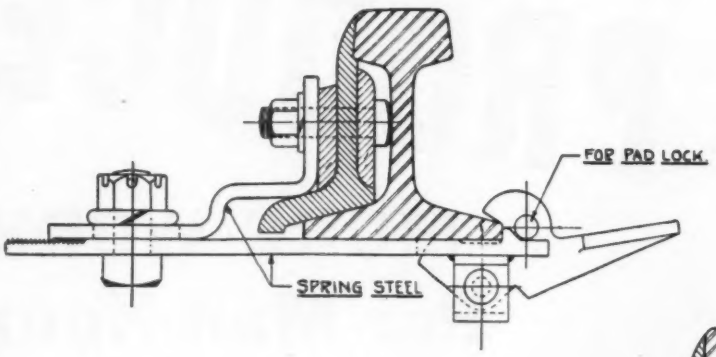
Tie Tamper Compressors
Tie Tampers
Spike Drivers
Track Wrenches
Grinders
Chipping Hammers
"Utility" Air Hoists
Wood Borers
Paving Breakers
Jackhamers
Impact Wrenches
Riveters

11-278

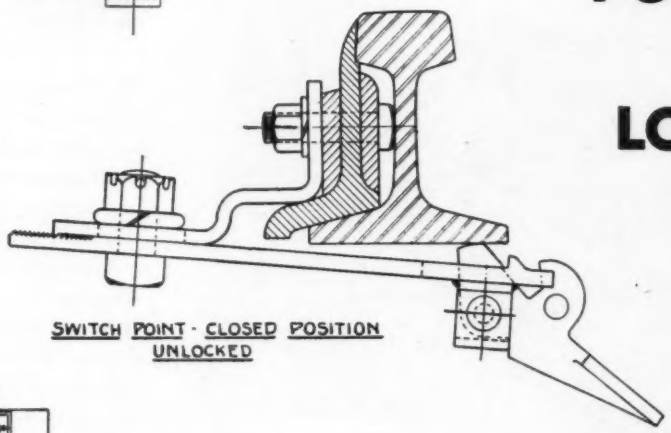
AUTOMATIC SWITCH POINT LOCK

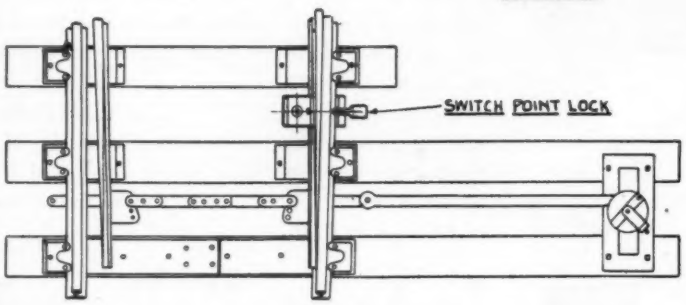
SAFETY WITH ECONOMY

SWITCH POINT - CLOSED POSITION - LOCKED

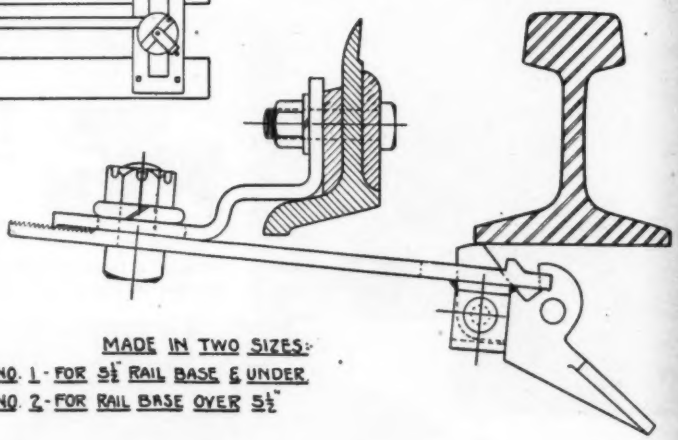


SWITCH POINT - CLOSED POSITION UNLOCKED





SWITCH POINT - OPEN POSITION



The switch point lock is a safety device, of rugged construction, simple in design, and a self-contained unit. It is automatic in its closing and locking action.

To operate the switch point lock, put foot on lever and push down, then operate switch stand lever in usual manner to throw or open switch. To close switch, operate switch stand lever in the usual manner and the device automatically returns to its normal or locked position.

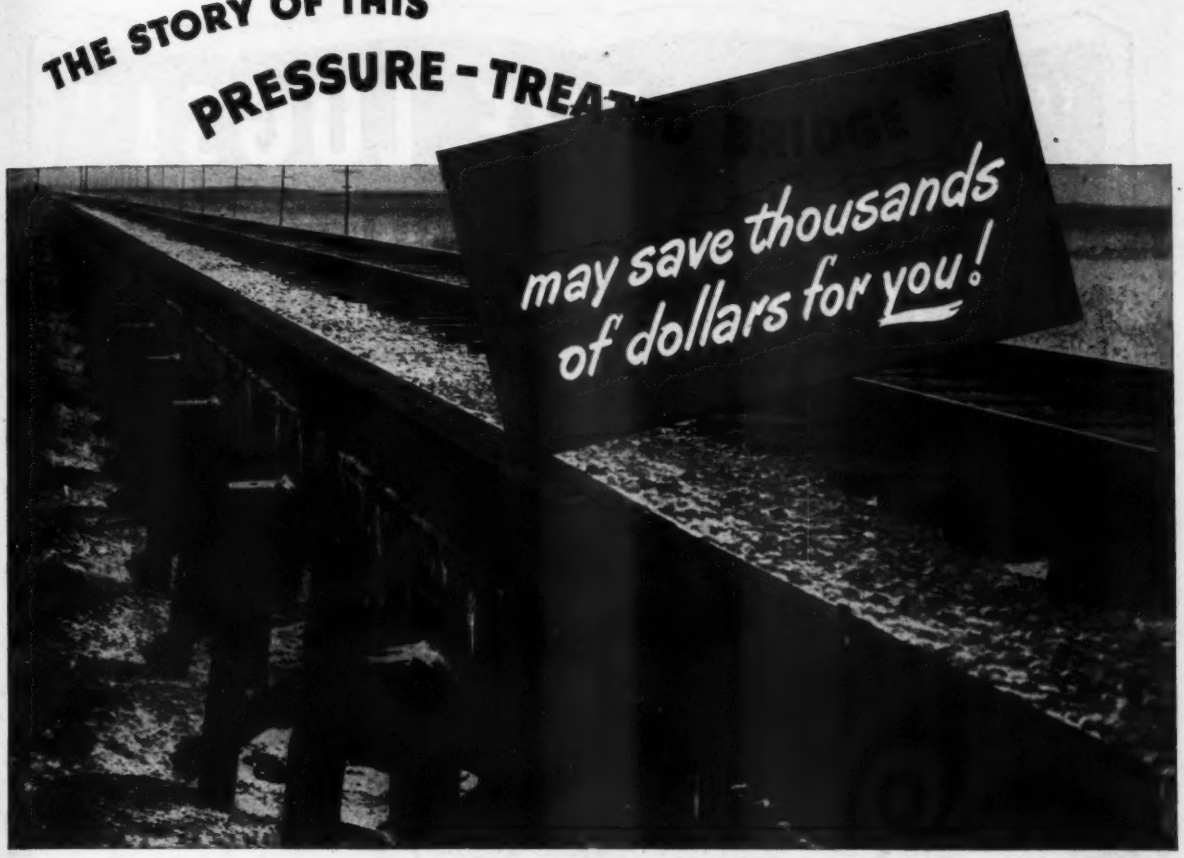
MADE IN TWO SIZES:-
NO. 1 - FOR 5½" RAIL BASE & UNDER
NO. 2 - FOR RAIL BASE OVER 5½"

THE RAILS COMPANY

General Office
178 GOFFE STREET
NEW HAVEN 11, CONN.

ST. LOUIS, MO. HOBOKEN, N. J. CHICAGO, ILL.

THE STORY OF THIS PRESSURE-TREA[illegible] BRIDGE*



*On the St. Louis Division, B & O RR

Every engineer who is thinking in terms of permanent, economical construction, immediate or post-war, can get some food for profitable thought from the history of this 500-foot railroad bridge.

It was built in 1910, with 5 to 6 red oak piles per bent, and with a yellow pine deck. All material was pressure-treated with creosote.

In 1930 a maintenance engineer inspected the structure and found it in perfect condition. He predicted a useful life of 40 years, and on a straight-line basis estimated the total interest charges and amortization as $1910 per year. In a similar structure, built of other materials, the interest charges alone—assuming perpetual life, and no maintenance—were $3750 per year, almost TWICE the cost of the pressure-treated wood structure.

According to current engineering reports, it is only within the last five years that any serious deterioration has occurred, and only within the last two years that any considerable amount of renewals were necessary. It was stated that "The structure is still in fair condition and should not require any large expenditures for renewals or replacement for another 5 years." This will bring its age to 39.

If only a 30-year life had been realized, the yearly interest and amortization charges would have amounted, on a straight-line basis, to $2100 a year . . . a saving of almost $50,000 for the period.

Perhaps a similar simple analysis of costs and life will point out some substantial savings-possibilities in some of the structures you are planning. Our bulletin will give you a picture-story of a few of many applications where pressure-treated wood is cutting construction time, costs, and maintenance. Ask for "Economical and Permanent Construction with Pressure-Treated Wood."

KOPPERS COMPANY • WOOD PRESERVING DIVISION

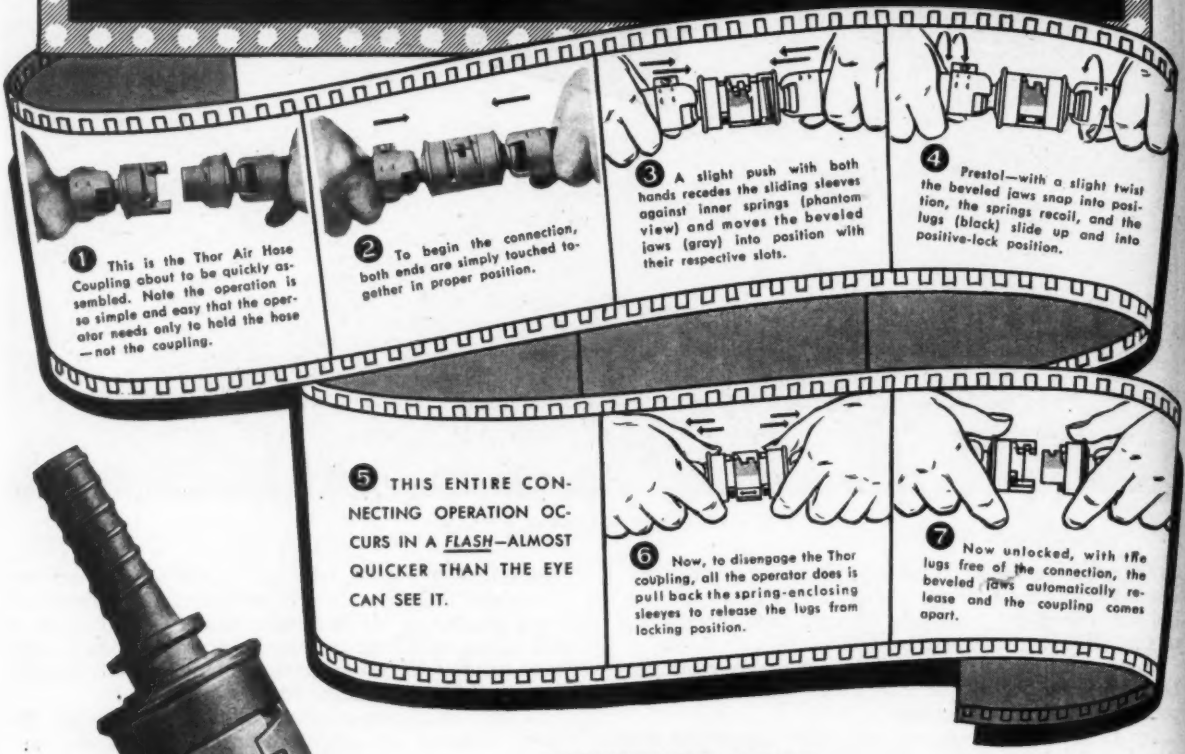
PITTSBURGH 19, PA.

KOPPERS

THE INDUSTRY THAT SERVES ALL INDUSTRY

"WATCH THE LUGS!"

for the Simple Secret of SAFER, POSITIVE-LOCK Thor HOSE COUPLINGS



1 This is the Thor Air Hose Coupling about to be quickly assembled. Note the operation is so simple and easy that the operator needs only to hold the hose—not the coupling.

2 To begin the connection, both ends are simply touched together in proper position.

3 A slight push with both hands recedes the sliding sleeves against inner springs (phantom view) and moves the beveled jaws (gray) into position with their respective slots.

4 Presto!—with a slight twist the beveled jaws snap into position, the springs recoil, and the lugs (black) slide up and into positive-lock position.

5 THIS ENTIRE CONNECTING OPERATION OCCURS IN A *FLASH*—ALMOST QUICKER THAN THE EYE CAN SEE IT.

6 Now, to disengage the Thor coupling, all the operator does is pull back the spring-enclosing sleeves to release the lugs from locking position.

7 Now unlocked, with the lugs free of the connection, the beveled jaws automatically release and the coupling comes apart.

Thor

HOSE COUPLINGS

. . . interchangeable between all sizes and combinations up to ¾ inches, inclusive. Each hose end is identical with the other—no right or left . . . no male or female—making a universal coupling. Write today for complete information in Thor Catalog 42-A.

SIMPLE? YES! But in this simplicity of spring-operated locking lugs controlling the beveled jaws lies the *positive-lock* feature that makes the Thor Hose Coupling the *safer . . . perfect* connection. Easy to operate, this Thor coupling will save you both time and money.

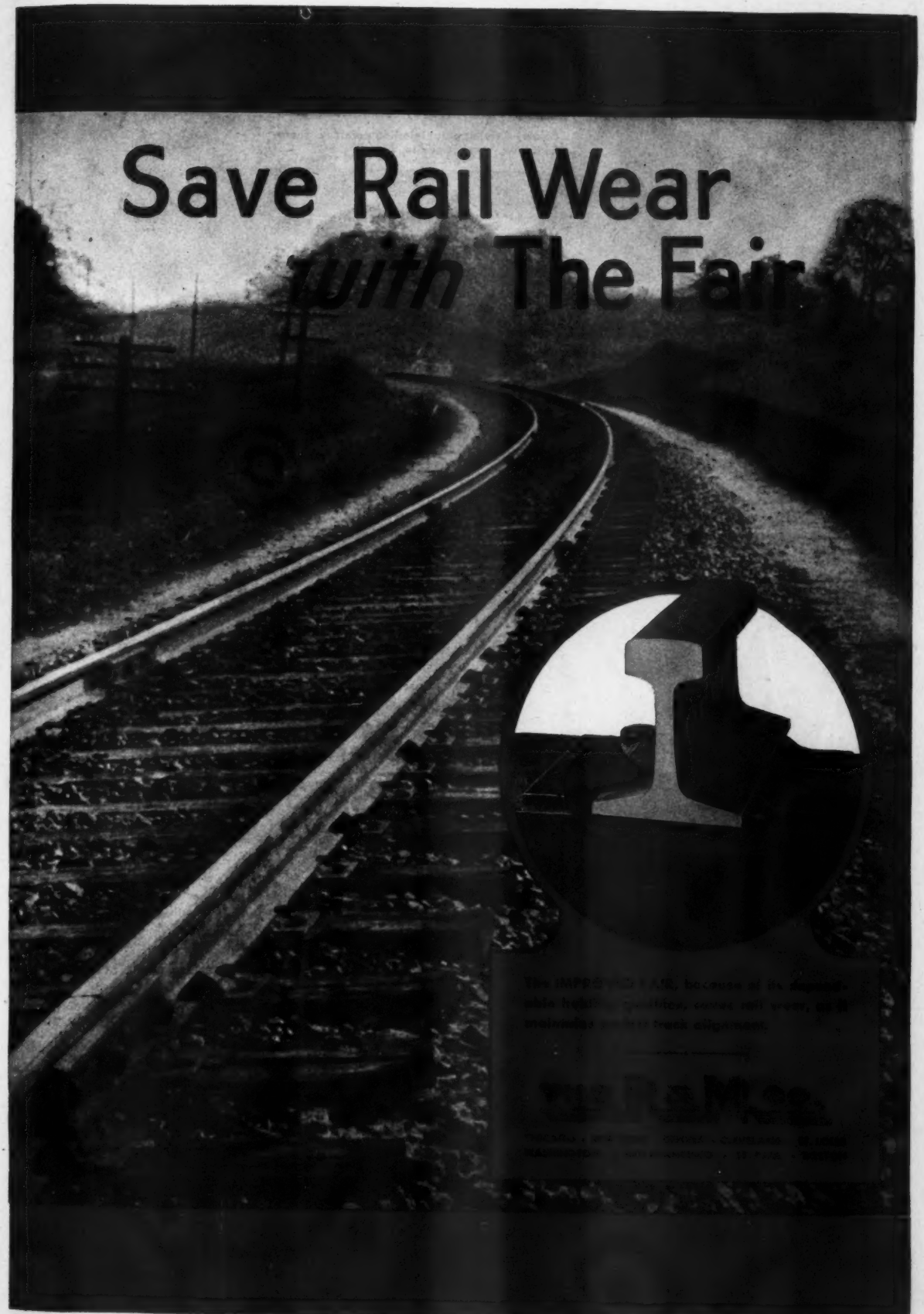
Positively locked, it cannot be accidentally disconnected to endanger the operator of the tool. Even if one hose end strikes a snag and the sleeve slides back, the sleeve on the opposite side *stays in position* to retain the connection . . . *because the sleeves must be pulled in opposite directions simultaneously to disengage the locking lugs!*

Thor *Portable Pneumatic and Electric Tools*

INDEPENDENT PNEUMATIC TOOL COMPANY

600 W. JACKSON BOULEVARD, CHICAGO 6, ILL.

Branches in Principal Cities


Save Rail Wear
with The Fair

Section gang preparing for pressure grouting on Santa Fe Railway near Thatcher, Colo.

Below—Driving grout injection points on Santa Fe Railway near Amarillo, Texas.

PRESSURE GROUTING

helps attain uniformly stiff track support

Eight years of service tests under mainline track of major railroads have demonstrated that pressure grouting of weak subgrades helps attain uniformly stiff track support.

Weakness in track is attacked as a foundation problem when you pressure grout your tracks with portland cement. Free water which surges under the track with the passage of every train is driven out of water pockets and its return is prevented. The track load is spread over the subgrade. Maintenance troubles caused by "mushy" tracks are reduced. Track is kept in line and grade with less labor and the necessity for slow orders is eliminated.

Pressure grouting to stabilize subgrades is growing in favor on many railroads because of the positive results obtained, the simplicity of the technique and equipment employed and the consistent saving in track labor. Work is done by regular section gangs without interruption to busy traffic.

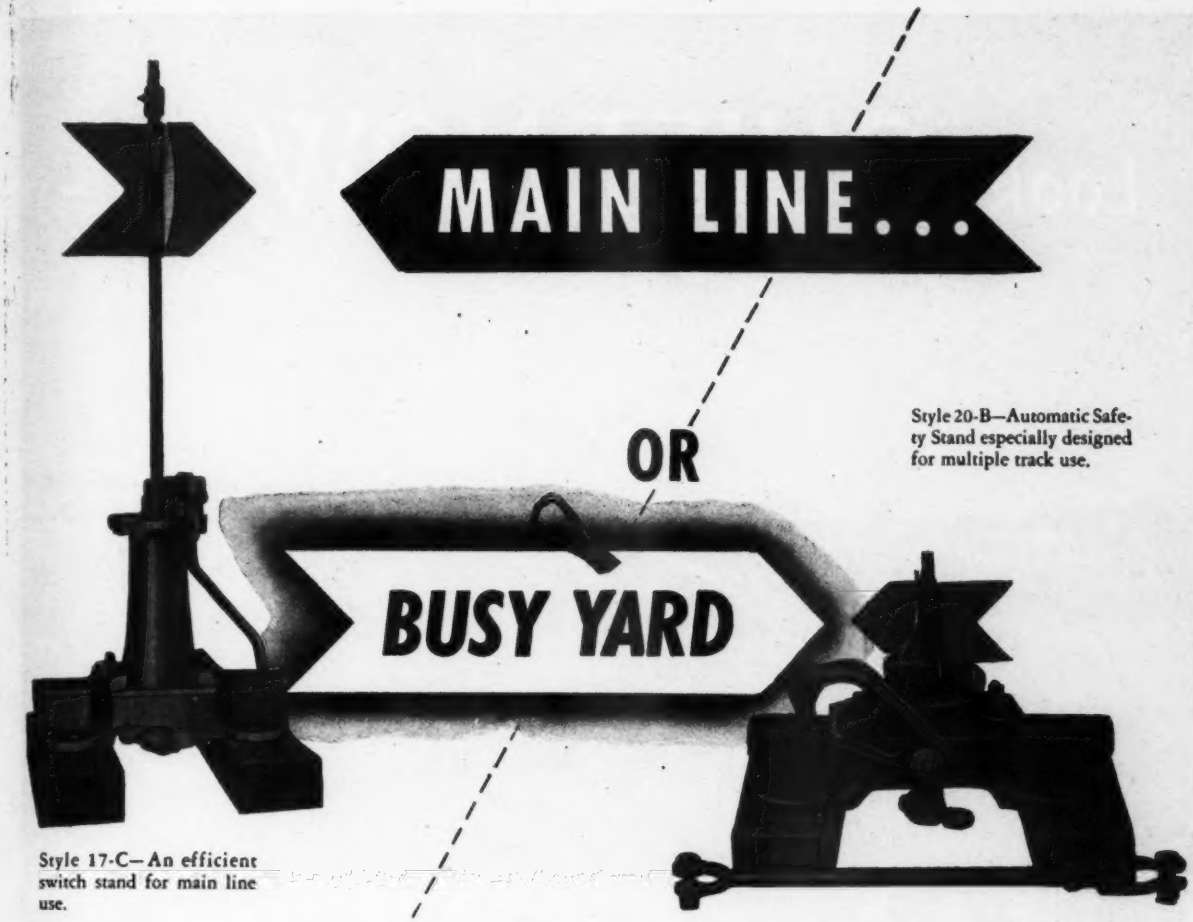
Our engineers, working with railroad engineers, have developed valuable experience with grouting under field conditions. Let us help you determine how grouting can eliminate troublesome spots and solve maintenance problems.

PORTLAND CEMENT ASSOCIATION

Dept. 8-27, 33 W. Grand Ave., Chicago 10, Illinois

A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work

BUY MORE WAR BONDS



Style 20-B—Automatic Safety Stand especially designed for multiple track use.

Style 17-C—An efficient switch stand for main line use.

THERE'S A RACOR AUTOMATIC SAFETY SWITCH FOR EACH

Eversure Lock—furnished when specified.

Safety and Economy are overworked words, but they are mighty important features of the Racor Automatic Safety Switch Stands. A special Racor feature is that they are always set for automatic action, whether locked or not, but are absolutely rigid for hand operation.

If a train trails through, the wheel flange will automatically throw the switch to the opposite position.

For Main line tracks, the 17-C Racor Automatic is recommended. In addition to good target visibility, the height is convenient for hand operation. To eliminate padlocks, Eversure lock can be furnished, when specified.

For Yards or multi-track locations, the 20-B is recommended. Switch position is always indicated by the low target.

Expensive repairs, often caused when rigid stands are trailed, are eliminated—just *one* of its economy features. A hook or padlock may be used in the locking eye after hand throw is completed.

Brake Shoe

No.3710

RAMAPO AJAX DIVISION RACOR **230 PARK AVE., NEW YORK**

HILLBURN, N. Y. • NIAGARA FALLS, N. Y. • CHICAGO, ILL. • EAST ST. LOUIS, ILL. • PUEBLO, COLO. • SUPERIOR, WIS. • LOS ANGELES, CAL. • SEATTLE, WASH.
NIAGARA FALLS, ONTARIO

Looks QUIET NOW, but -

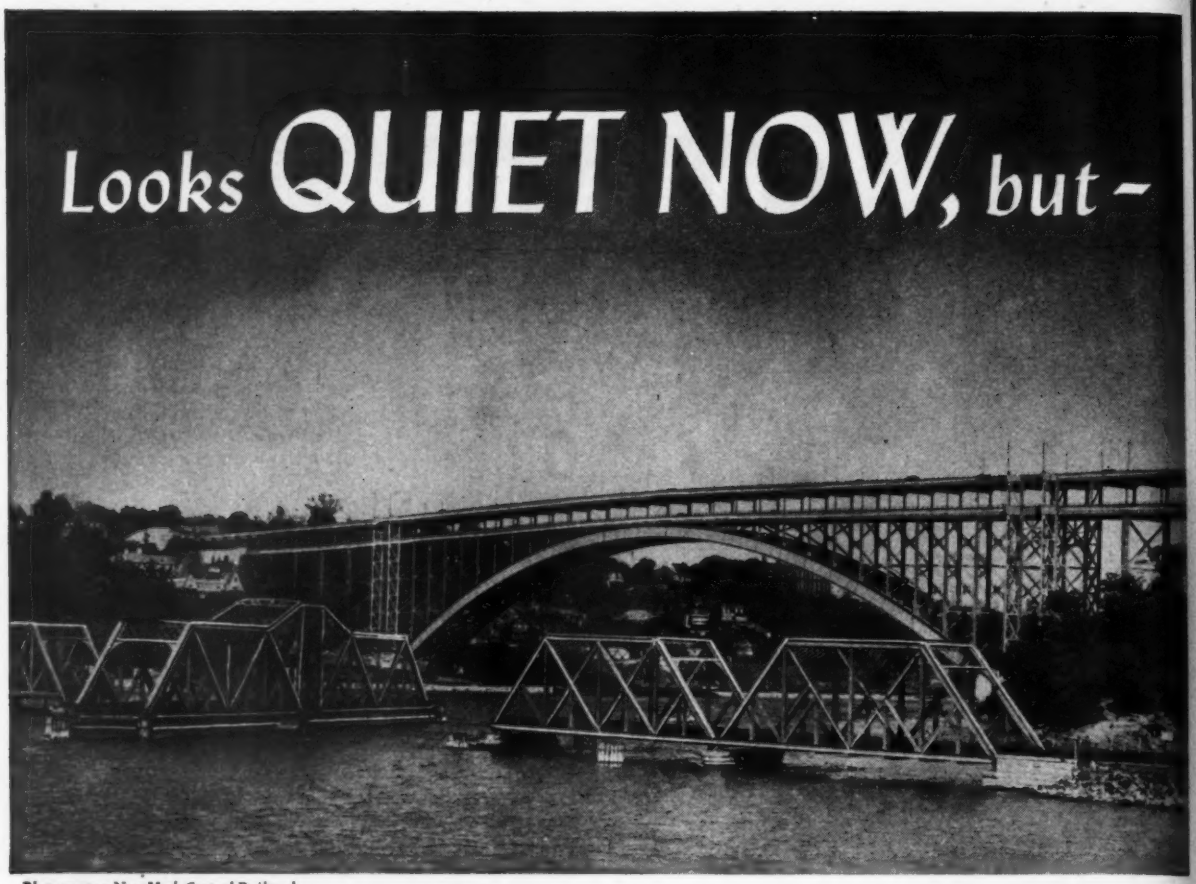


Photo courtesy New York Central Railroad

Rather a peaceful picture, isn't it?

But . . . it's not always that way.

Not with railroads now running the heaviest passenger and freight schedules in their history.

And with traffic as heavy as it is, no wonder maintenance of way is such a problem.

During this critical period Flintkote Asphalt Coatings have become more popular than ever.

Quick, easy application . . . exceptional protection under most conditions of weather and wear . . . special types for special applications . . . these qualities count heavily in hurried, harried times.

In highly specialized cases, engineering advice may be required. If so, a letter from you will put Flintkote's 40 years of experience to work for you.

FLINTKOTE INDUSTRIAL PRODUCTS

FLINTKOTE RAILROAD PRODUCTS . . . **Asphalt Emulsions . . . Asphalt Protective Coatings . . . Building Materials . . . Car Cements . . . Cold Mastic Flooring . . . Stock Car Flooring . . . Anti-Sweat Compound Waterproofing and Dampproofing Materials**

THE FLINTKOTE COMPANY · 30 Rockefeller Plaza, New York 20, N. Y.

Industrial Products Division

ATLANTA • BOSTON • CHICAGO HEIGHTS • WASHINGTON
DETROIT • LOS ANGELES • NEW ORLEANS • WACO • TORONTO

Prevent Rust, Avoid Corrosion

with PRESSTITE Asphalt Waterproofing Mastic

Particularly adapted to the prevention of rust and corrosion of railroad equipment while in storage, Presstite Asphalt Waterproofing Mastic (No. 2390) is being used by America's leading railroads.

Designed for brush or spray application, this Presstite compound is a special asphaltic jell, cut-back type, furnished ready for use, and a very fast drier. It dries to a rubber-like, elastic film free from tack.

Protect *your* parts in storage — castings, trucks, wheels, and many other pieces of equipment — against destructive rust and corrosion with this specialized Presstite product. One of the largest roads in the country uses many thousands of gallons per year for this purpose.

Presstite sealing and coating compounds include many diverse types, each developed to meet a particular requirement. Send us your requirements and let our *sealing specialists* work with your engineers.

PRESSTITE SEALING COMPOUNDS

PRESSTITE ENGINEERING COMPANY

3964 Chouteau Avenue, St. Louis 10, Missouri

"TOUGH GOING" brings out the True Value of CLETRAC Tru-Traction*

IN soggy tropical jungles . . . in muck and mud of Alaska . . . on bottomless roads in Russia . . . on the rugged hills of Italy . . . the mighty power of military crawler type equipment with *controlled differential steering* has been proved again and again.

Controlled differential steering is, and has been for 25 years, an *exclusive* operating feature with Cletrac. We call it *Tru-Traction,* because it gives power on *both* tracks at *all* times, and the ability to steer with the tractor under full control—uphill and down.

Today, practically all high speed military crawler type equipment uses *controlled differential steering* which is exclusive with Cletrac in the crawler tractor field.

In civil activities as in military movements . . . in logging camps . . . in highway construction . . . in oil fields . . . for heavy hauling, bulldozing or earth moving, wherever the going is tough—Cletrac can be depended upon to do the job—and do it economically.

A substantial number of Cletracs are being released for essential civilian use—allocated according to government regulations. Your Cletrac dealer will gladly assist you in making application for a new Cletrac if you can qualify as an essential user.

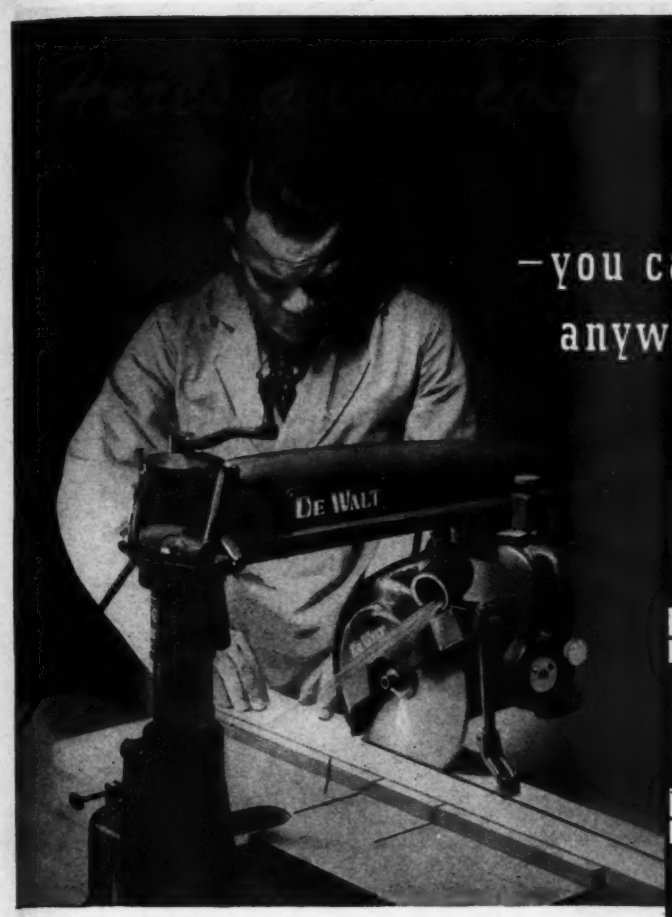
• • •

Illustrated at the right, below, is a folder recently published, telling of Cletrac's part in the war effort. A copy will be mailed on request.

*Tru-Traction is power on both tracks at all times

THE CLEVELAND TRACTOR COMPANY • CLEVELAND 17, OHIO

CLETRAC *Tru-Traction* TRACTORS



—you can use for many jobs anywhere in your plant!

STRAIGHT RIPPING

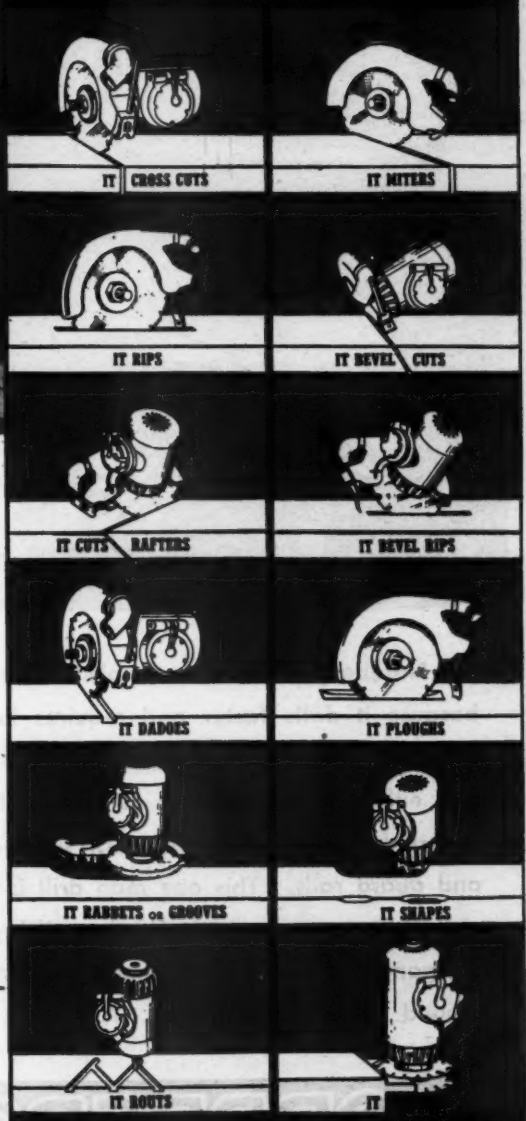
Here's the latest innnovation in wood-working machinery!

DeWalt is the answer to industry's need for a safe, easy-to-operate, adjustable, precision cut-off saw—for use in carpenter maintenance, pattern work, crating and boxing, production wood cutting, and for cutting and dapping timbers.

DeWalt is the ALL-PURPOSE machine that can be changed quickly, as required, from a straight-line cut-off saw—to miter saw—to rip saw—to dado machine—to shaper—or other operations that can be made with circular cutting tools.

No matter how, where or when you cut wood, there's a DeWalt that will reduce your cutting costs, conserve labor, simplify materials handling, save floor space, eliminate waste and actually reduce your investment in the wood-working machinery you require.

Illustrated above is the smallest of our many models. It is available in two sizes complete with motor: ½ HP one phase, AC, $125.00; ¾ HP three phase, AC, $135.00. The complete DeWalt line ranges up to 10 HP. If you're planning to buy a machine—make it a new DeWalt. Mail the coupon below—today!



Makes Every Cut Possible With a Circular Saw

DeWALT PRODUCTS CORPORATION
4904 Fountain Avenue, Lancaster, Penna.

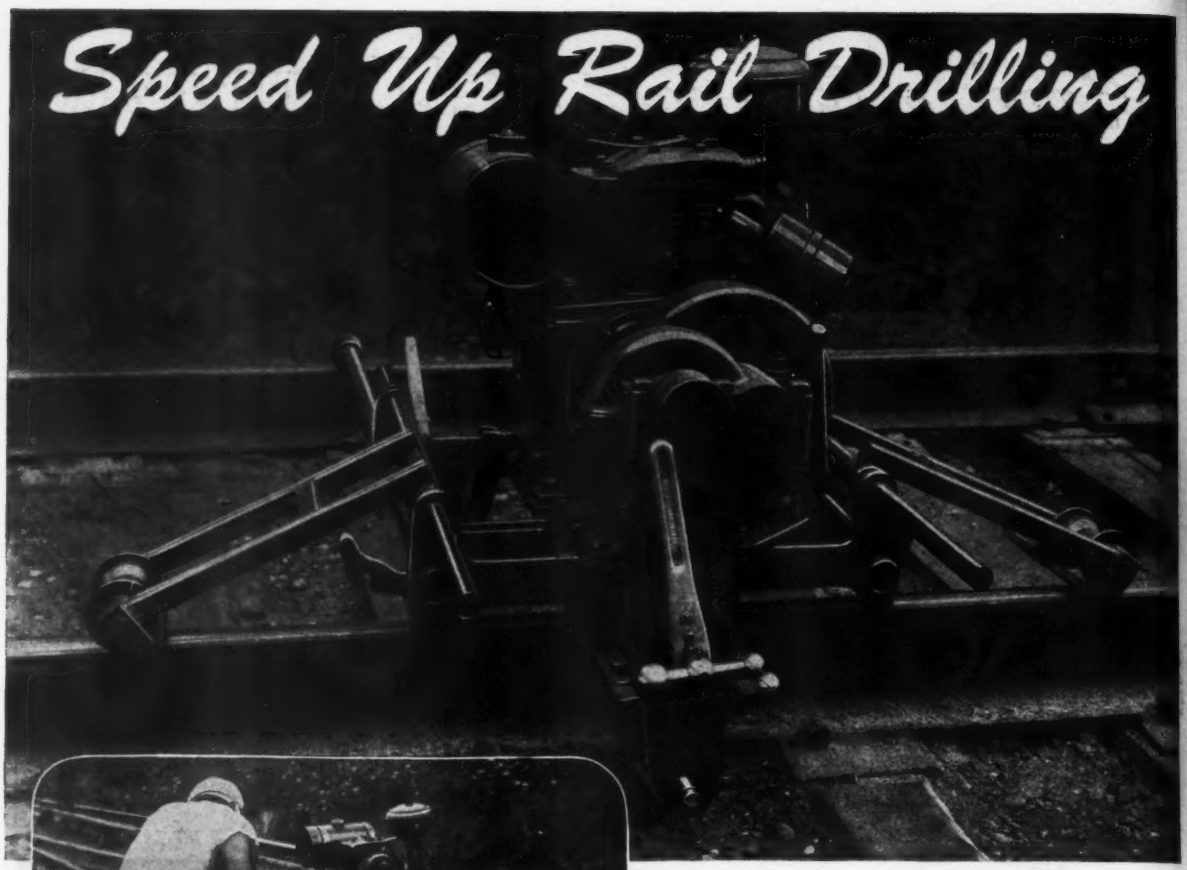
Please send me information on your small DeWalt ☐
Please send me information on your complete line ☐

Name_____

Address_____

City_____ State_____

Speed Up Rail Drilling



When drilling, the machine rests on the rail. When moving to the next job, the machine is pushed along the rail on the flanged rollers and stabilizing bar. Moving can easily be done by the operator.

The Nordberg Rail Drill accomplishes more because it drills faster and requires less time for setting up and adjusting. It will drill either at the inside or outside of the rail and in close quarters as at switches and guard rails. This one man drill is a good investment not only for the rail laying gang but where drilling must be done around yards and terminals.

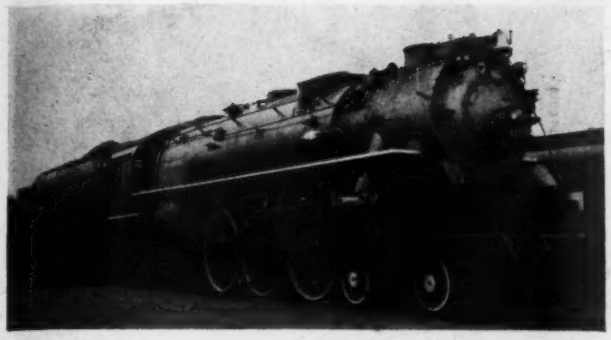
One feature of this drill is the positive chuck for holding the flat drill bit. This chuck automatically grips and holds the bit firmly in position. No tools are required for fastening the bit in the chuck or the chuck in the spindle. The chuck and bit can be removed with the tap of a hammer. The simplicity of this chuck is a big factor in the timesaving feature of this drill.

NORDBERG MACHINERY

NORDBERG MFG. CO. MILWAUKEE WISCONSIN

Export Representative—WONHAM Inc.—44 Whitehall St., New York

SAND !!



Valuable material—Sand. On the hard pull or the quick stop there's nothing better for the job.

BUT

When sand gets in sewers, it's just bad news. The pile of sand and dirt at left was taken from only 75′ of 36″ sewer.

LET PITTSBURGH PIPE CLEANER COMPANY CLEAN YOUR SEWERS!

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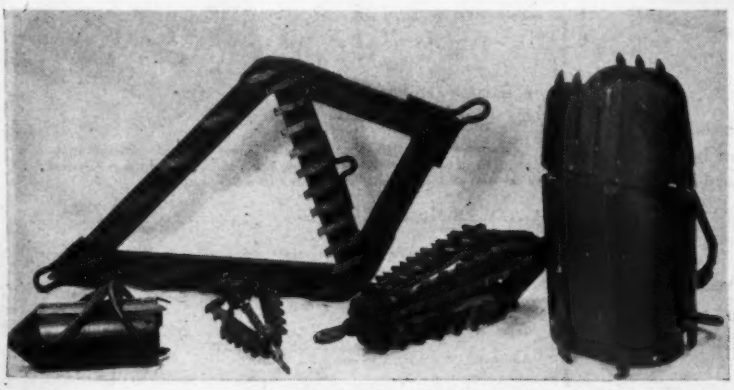

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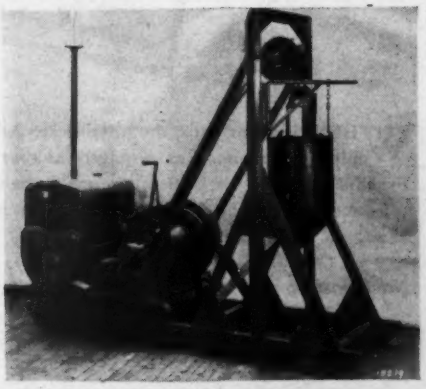

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No. 188 of a Series

Railway
Engineering and Maintenance
SIMMONS-BOARDMAN PUBLISHING CORPORATION
105 WEST ADAMS ST.
CHICAGO, ILL.

Subject: "Neglect?"

August 1, 1944

Dear Reader:

We received a letter a few days ago from a subscriber who "laid us over a barrel". I quote from his letter: "I enclose a money order for the renewal of my subscription. I do this with some reluctance. I am not unmindful of the fact that there is a war raging and railway news may be hard to get and pictures scarcer, but in reading your magazine one might conclude that there were only two or three railways in America that were doing anything in maintenance work. Surely this cannot be true. For instance, during war time, salvaging is very much to the fore and all railways must do more or less of it. Yet, with the exception of a few accounts of rail cropping and bridge strengthening there were not many articles of that nature described by you last year."

In spite of the fact that this subscriber is one of a very small minority who have ignored repeated requests from our circulation department for information regarding his railway occupation for our classification of readers, and we are, therefore, in the dark as to his interests and needs, we have analyzed our pages for the last year in the light of his criticisms regarding (a) the number of roads whose activities were described, (b) the number of illustrations published and (c) the attention given to the war-created problem of scrap collection and salvage.

Referring first to the extent to which we have covered the activities of various roads, we find that in the 12 issues from July, 1943, to June, 1944, inclusive, we described work or methods on 41 different railways, ranging all the way from Boston and Maine in New England and the Central of Georgia in the Southeast to the Burlington, the Milwaukee and the North Western in the Central states, the Katy in the Southwest, the Rio Grande in the Inter-Mountain area and the Southern Pacific on the Pacific Coast—not to mention the Canadian Pacific and the Canadian National in Canada. This is our answer to this criticism.

As regards photographs, we published 360 illustrations in our feature pages (between our editorial and news pages) in the year from July, 1943, to June, 1944. By way of comparison, we published 368 illustrations in 1940. Likewise, we published 464 editorial pages in the last 12 months, as compared with 484 pages in 1940. We submit that this does not reflect a serious let down in either editorial content or illustrations—in the face of the fact that we are operating under a government-imposed reduction of 25 per cent in paper.

And as regards salvage, a check of our columns shows that we have published 57 articles dealing with the conservation or salvage of materials in the last year. In the light of these figures, we plead not guilty to the charge of neglect of this important activity growing out of the war.

This is our record. We submit it to you as the jury. Are we guilty of the charges made?

Yours sincerely,

Elmer T. Howson

ETH:KW

Editor

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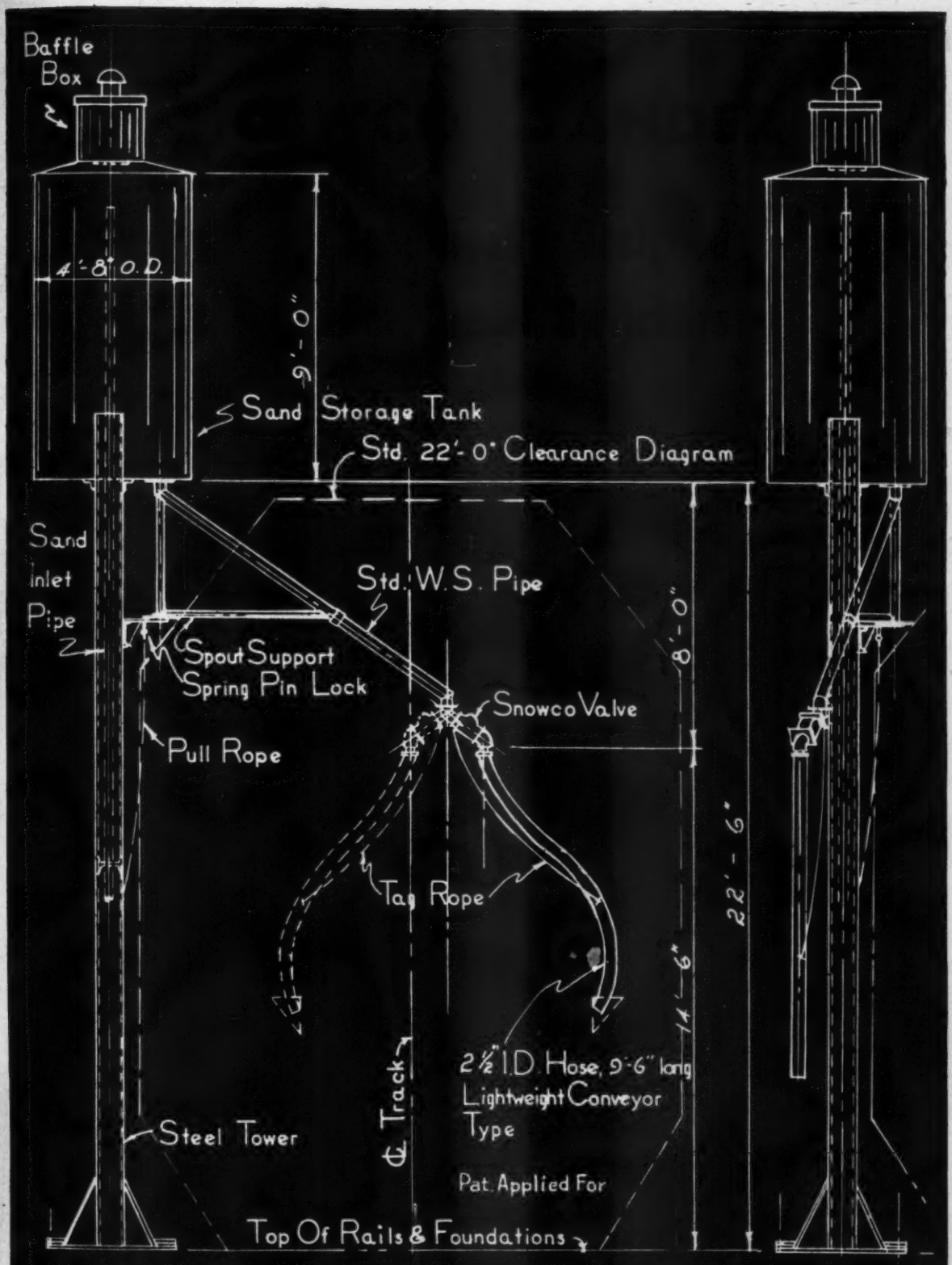

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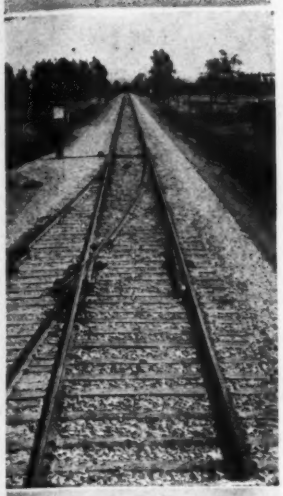

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Railway Engineering and Maintenance

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AUGUST, 1944

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Railway Engineering and Maintenance

Our Railroads—

The Backbone of American Transportation

In 1943 more service was rendered the American public by all agencies of transportation than in any previous year. In freight, they exceeded a trillion ton-miles for the first time in history, with a total of 1,018 billion ton-miles, as compared with 925 billion ton-miles in 1942, the previous record year. In passenger service these various agencies of transportation produced 122 billion passenger-miles, as contrasted with 82 billion passenger-miles the previous year.

Railways' Proportion Increases

Of special significance to railway employees is the fact that the proportions of these totals produced by the railways increased from 62 to nearly 72 per cent for freight and from 61 to more than 70 per cent for passenger traffic. In other words, the railways handled more than twice the volume of traffic, both freight and passenger, that was carried by *all* other agencies of transportation combined. Furthermore, in 1943 the railroads handled 95 per cent of the total increase in freight traffic and 80 per cent of the increase in passenger traffic, over 1942, and they are handling 23 per cent more passenger and 5 per cent more freight traffic (figures for first four months) this year than in 1943.

In this positive and striking manner, the railways are demonstrating their indispensability to the nation's welfare in a time of national emergency—our armed forces and the industries back of them have turned to the railways not only to assume their full share of the national upsurge in traffic but, in addition, to take over part or all of the loads heretofore carried on the waterways and the highways and in the air. Without opportunity for preparation and with depleted equipment and under-maintained facilities from more than ten years of acute depression, the railways have taken on this load and have met all demands with an efficiency that has won universal admiration.

Contrast with Last War

This record constitutes a remarkable tribute to private management for it will be recalled that the government took over and operated the railways during the last war. Indicative of the comparative results obtained is the recollection that on May 24, 1919, the Director General in charge of the operation of the railways for the government asked Congress for an appropriation of $1,200,000,000 to make good the government's operating loss—and this was in addition to $500,000,000 appropriated the previous year for the same purpose. By way of contrast, in 1942 these railways contributed $1,202,000,000 in the form of taxes for the support of government and their payments for this purpose are now running at the rate of $1,800,000,000 a year.

These are some of the high points of the railways' contribution to this war. They constitute a tribute to the initiative and ingenuity of the railways when left free to work out their own problems. The record which the railways are now making is one in which every employee can take justifiable pride for he has had a part in its creation.

Inspection—

Must Be More Careful and More Frequent

BEGINNING more than a decade ago, funds for maintenance were at such low ebb that many repairs to bridges that were considered desirable but that did not then endanger the safety of trains, were deferred until a more favorable time. Before funds were again available to wipe out this deferred maintenance, the war, with its amazing increase in traffic, was upon us, and restrictions were suddenly clamped on the use of materials. As a result, despite the unprecedented volume of traffic that is now moving and the high rate of wear and tear to which these structures have been subjected for almost four years, some of the repairs that should have been made as long as 15 years ago are still among the deferred items.

Traffic is still increasing and is likely to continue its upward trend until the campaigns in Europe are completed. Furthermore, there are no present indications that when the activity in Europe has subsided there will be any drop in traffic, although the direction of flow may change. It must not be overlooked that we will still have a war of major magnitude on our hands, which may continue for a long period and make as great demands on our resources as are being made at present.

This does not of necessity mean that the structures in question are unsafe, for it is possible to take measures to prevent this, although such measures may be neither desirable nor economical. It does mean, however, that reserves are being depleted at an unusual rate in many bridges and that they have been exhausted in others. In addition, because of the number of trains and the speeds of operation, the opportunities for accident are greatly increased. Such a situation calls for closer and more frequent scrutiny of all structures and particularly of those that are below standard.

Adequate inspection can be assured only when it is organized and systematized. This is particularly true for bridges, which require inspectors with special skill and experience. It is common practice to employ inspectors who work under the direction of the bridge engineer on a system or regional basis, and then to require foremen of district or floating gangs to make monthly inspections of the structures on their more limited territories. This may have been satisfactory in normal times, although the system inspectors generally gave practically all of their time to steel structures, and the foremen were required to be absent too much from their gangs.

At present, the need for frequent and careful inspection is so much greater than in normal times that the assignment of regular division bridge inspectors is worthy of consideration. This will supplement the system inspection and insure more frequent examinations than the system men can make; it will release the district foreman and increase his productive time; and it will insure that all structures—steel and wood bridges, and culverts—will be examined regularly by men who will soon come to know them intimately, and who will thus be in position to assess their potentialities.

Bridge foremen have always been burdened with a multitude of duties that have prevented them from giving this phase of their work the attention that its importance deserves. This is more true today than in the past, not only because of the greater amount of work that is now being demanded of them, but because the present shortage of labor requires that they remain with their gangs. To be satisfactory, the division bridge inspector must be a man of experience, with a knowledge of steel, concrete and wood construction; he must be dependable; and he must have a complete knowledge of the possibilities and limitations of the materials contained in the structures.

Tool Houses—

Show First Innovation in Many Years

AN innovation in tool houses is making its appearance on several railways in the northern part of the country, which has several features to commend it where conditions warrant, and which seem certain to win more general adoption for it in cold climates. In fact, the surprising thing about these new-style houses is that they have not been adopted more generally before.

The outstanding feature of the houses, one of which is described in this issue, is that they provide a room, entirely apart from the tool and motor car compartment, equipped with a stove and benches, where, during cold weather, the men can congregate in the morning before starting out to work, and where, in inclement weather, they can eat their lunch or await assignments. An equally important function of these rooms is their use by the foreman while making out his reports, where he can have the convenience of a table or desk, proper light, and heat during cold weather. A second feature of these new houses is the general tendency to provide a larger area for the storage of track accessories and tools, and for the housing of a push car as well as a motor car. This tendency is not surprising as many gangs today have more power tools and machines, such as tie tampers, auxiliary power units, mowing machines, weed burners, etc., than ever before, some of which units, for lack of space in the house, have heretofore had to be left out in the weather. Obviously, the tool houses have their greatest value in northern climates, especially from the standpoint of the warm room, and are particularly suited to yard gangs, which are more generally within reach of their tool houses during severe weather, which make it a general practice to spend their lunch periods at their headquarters, and which frequently have a larger number, if not a larger variety, of tools. However, at least one road has provided a few of these "warm room" tool houses in the north for section gangs out on the line, especially where station waiting rooms are not readily accessible for use by the section men, where such rooms are too small for their use, or where station agents have complained because the section men soil the seats with their work clothes or leave the waiting room in an untidy condition after use.

Obviously, the railroads should not be called upon to build new tool houses or to enlarge existing houses to provide these special features where they are not warranted by weather or other conditions, but the one feature of the new style houses that commends itself

quite generally in cold temperatures is the place afforded the foreman to make out his reports, which in many cases are increasingly numerous. In the light of this trend, we cannot help but have some sympathy for the foreman who said recently that he not only needed an office, but an office force as well.

High School Boys—

Require Consideration But Not Coddling

WITH more than 20,000 boys of high school age working in the maintenance of way department of the railways during the current summer, in bridge and building and water service work as well as in track work, the railways have an opportunity to get a large volume of essential work accomplished which would not be possible otherwise, and an unequalled opportunity to interest a large number of boys in railroading as their life work. At the same time, in the employment of these boys, they have accepted a serious responsibility, not alone to insure their safety and general well-being while at work on the railroad, but to see that the boys, many of whom are working for the first time, assume the right attitude toward their work and earns the satisfaction of a job well done.

Ever since the practice of hiring high school boys on a large scale was started last year, the railroads have leaned backward to insure their safety and general well being. They have generally selected with great care the foremen under whom the boys are to work; they have made safe working conditions and practices a matter of paramount importance. In addition, where employed in large extra gangs, the railways have frequently employed the local high school coach or principal as a monitor to look after the interests of the boys; have worked and housed the boys separately from older men, giving special consideration to their diet and housing conditions; and have even organized group sports among the boy's evenings and during week-ends.

All of this is as it should be, in the interest of the work to be done and in the interest of the boys themselves—with one possible exception. Certainly, in the matter of safety, too careful precautions cannot be taken to avoid personal injuries, whether from carelessness or overstrain. Likewise, in the matter of health, food and general sanitary conditions, the railways are warranted in going the limit. But when repeated complaints are being heard in various quarters, including the parents of some of the boys, that in at least some of the gangs the boys are learning to become loafers at 62 cents an hour, it seems time to make a check up of conditions. One of the latest of these complaints has come from a small-town business man, who, while speaking of labor problems in his own business, decried the fact that his own son, a high school boy, working in a track gang on the railroad, has come home repeatedly boasting about how little was required of him and the rest of his companions, and indicating a total lack of seriousness in the conduct of their work.

Knowing how intelligently and effectively the boys are being employed on most roads, it is difficult to believe that the conditions referred to represent more than a few isolated cases, but the fact that any such cases prevail should be a matter of concern. The boys must be shown consideration befitting their age and physical limitations, but at the same time they should be given to understand that work on or about the tracks of the railways is serious business, and should be required to carry out their duties carefully and conscientiously. To do less is to breed indifference and carelessness, if not disrespect, among them, which is contrary to the interests of both the railways and the boys themselves.

Accident Prevention—

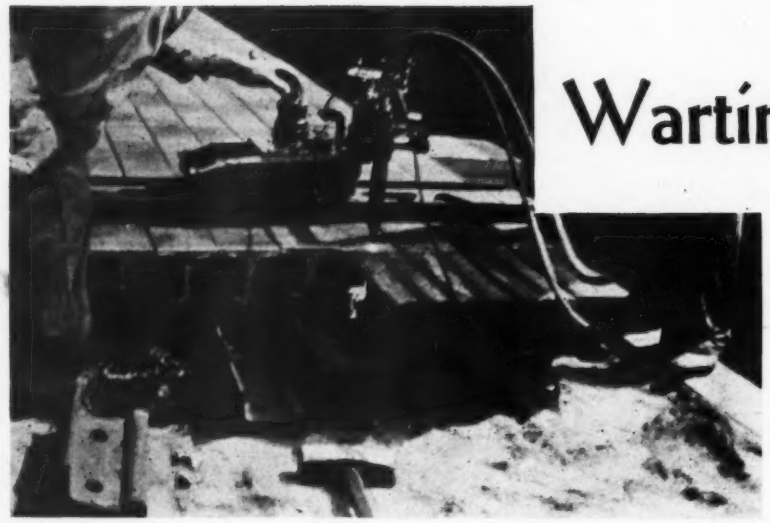
The Responsibility of Supervisory Officers

WITH personal injuries in the maintenance of way and structures department increasing among experienced employees as well as among new employees, it is time for some plain, straight-from-the-shoulder comments on this subject. Accordingly, we present in this issue just such comments, made by R. D. Copeland, safety inspector on the Wabash, before a recent meeting of the Central States Safety Congress at Kansas City, Mo., who practices what he preaches when he tells supervisory officers that they must "never pull their punches when dealing with unsafe practices." Furthermore, Mr. Copeland is on sound ground when he lays much of the problem of safety among the maintenance forces directly in the laps of the supervisory officers in that department, and challenges them to put safety across among their men by coming down to their level with plain, every-day language, and by setting a flawless safety example themselves.

In this regard, he emphasizes that any attitude of aloofness or superiority by supervisory officers who may have had the benefit of a technical education "must be dispelled at once"; that there is no room for a "high-hat" attitude in the promotion of safety; and that he must talk the language of his men—with them, and not at them.

Still stressing the part of the supervisory officer in the effective promotion of safety, Mr. Copeland points out that there is no place for the "good sport" attitude in countenancing violations of safety rules; that rule observance must be insisted upon under all circumstances; and that at no time must the supervisory officer himself violate a safety rule.

It is true, as President W. M. Jeffers of the Union Pacific observed recently in accepting the Harriman safety award on behalf of his organization, that the success in improving safety records usually has its origin in top management, but Mr. Jeffers and top management generally would be the first to recognize that it is the supervisory officer in the field, down to and including foremen, who must put safety across among the rank and file of employees. Furthermore, to most employees in the ranks, their immediate supervisory officer is "top management," and his word is final. As such, this supervisory officer bears the greatest responsibility in the attitude of his men toward safety, and today's slipping safety record will never be improved until he accepts that responsibility and lets nothing else interfere with his discharging it.



Wartime Problems

Cropping Rails with a Machine Torch. Rails Were First Cut Through the Ball When Upright and Were Then Turned Over for the Final Cut

Under the difficult conditions prevailing today, the conservation of track materials constitutes a field of activity of vital importance to the railroads in their efforts to carry the burdens imposed on them—and in furtherance of this activity welding and cutting procedures are playing a major part. In this article Mr. Daley discusses the various applications of these processes in track work, giving emphasis to the latest practices and the newer applications and techniques

C. A. Daley

IN their struggle to keep railway tracks in condition to carry the record volume of traffic imposed by the war effort, railway maintenance officers have placed increasing reliance on welding and cutting processes as a means of conserving critical materials. Fundamentally, the situation has been one in which the steel parts of the track structure have been subjected to unprecedented wear at a time when the materials available for replacement have been far below actual needs. To a large extent, therefore, the success of efforts to solve the problem have been dependent on the ability to prolong the service life of rails, frogs and switches by repairing or reclaiming worn material —and it is in this capacity that the welding and cutting processes have come to the aid of maintenance men in their hour of need. As a logical outcome of the increased emphasis on these procedures, the scope of their application has been broadened and there have been many improvements and refinements in methods and also in technique.

Rail End Welding

Probably the largest single application of the oxyacetylene welding process in track work continues to be the building up of battered rail ends. In this application the procedure on most roads had become pretty well standardized before the war, and there has not been a great deal of change since. On some roads, battered rail ends are repaired by reforming them when the depth of wear does not exceed 1/16 in. and is not accompanied by chipping of the end metal. Briefly, this procedure involves the heating and reshaping of the rail ends in such a manner as to raise the battered areas the desired amount. When the reforming of the rail ends will not suffice, new metal must be applied by welding, and in doing this by the oxyacetylene process several different procedures or techniques are employed.

When it is desired to economize in time and material as much as possible in rail-end welding, only part of the worn surface may be built up. Recently, a method for making such welds was developed in which the weld is run across the surface of the ball for its full width and for a distance of about an inch from the rail end, beyond which it is permitted to taper to a width of only 1¼ in., centered on the ball surface, at the opposite end. In this way the extreme end of the rail, which is the area that is most vulnerable to batter, is given the full protection of a broad contact area for the wheels, while the less vulnerable area is treated more economically. Part-area welds made in this manner are not apt to acquire a depressed or cupped area behind the full-ball section. This procedure is not recommended for use with rail that carries heavy traffic.

Cropping Rails

In some instances the condition of the rail ends may be such that the building up of the running surface may not suffice, in which event the practice on many roads is to crop the ends to permit the rails to be continued in, or returned to, service. Recently a Radiagraph (a cutting torch mounted on a carriage operating on guides) was used for this purpose in an improvised setup. In this operation 10 rails were laid side by side in the upright position on three transverse supports. The rails were swung into position on the supports with a crane, being brought up against a bumping block so that they would be parallel, with the ends flush with each other.

The track for the machine torch was then placed across the bed of rails near one end and clamped into position with C clamps. Next the Radiagraph was set in operation at one side of the rail bed, and as it moved across the rails a cut was made through the ball of each of them. A similar cut was made at the opposite ends. To complete the cropping operation, the rails were then turned over and cuts were made through the bases in a similar manner. Finally, the rails were redrilled and loaded into cars for reshipment. With this setup, one operator was able to crop both ends from 100 rails in an eight-hour day.

Following the successful adapta-

Emphasize Role of Welding in Maintenance Work

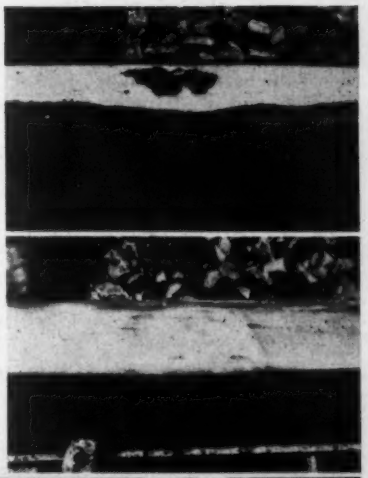
By C. A. Daley

Maintenance of Way Engineer,
Air Reduction Sales Company
New York

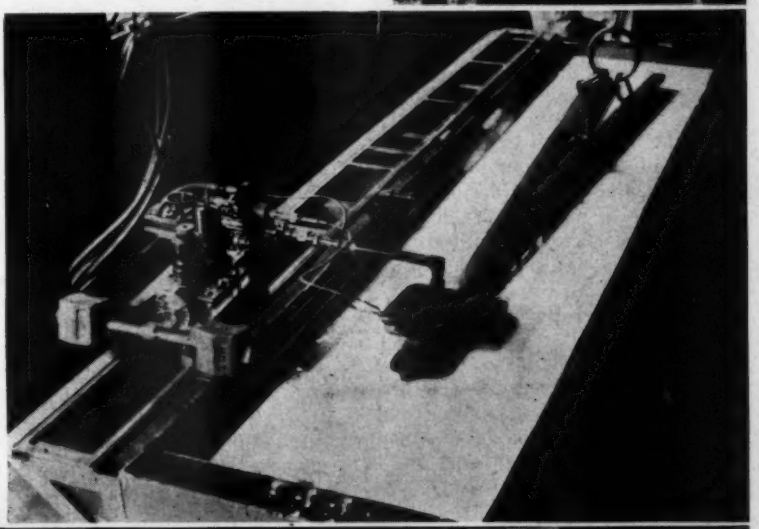
tion of the machine-cutting torch to the cropping of rails, a portable hand-operated device has been developed for cropping rails either on skids or in the track. This, in turn, led to the development of a portable cropping machine embodying two torches, one for cutting through the ball of the rail and the other through the base. For finishing rails cropped in this manner, the end faces in the web section are ground lightly with an emery wheel to remove any possible superficial thermal checks and at the same time the ends are beveled slightly.

Butt-Welding Refined

It is now common practice on many railroads to eliminate rail joints in streets, grade crossings, station platforms and other locations by butt-welding the rail ends, and frequently this work is done by manual welding. From time to time refinements have been introduced in the technique involved in making manual butt-welds, looking largely to the elimination of any internal stresses which might otherwise be introduced during the welding procedure. To obtain the best results, careful attention must be given to all phases of the work, including the scarfing of the rail ends,



Right Above—A Typical Wheel Burn After It Has Shelled Out. Right—A Built-Up Burned Spot After Six Months' Service



Right—Showing the Set-Up used for Flame-Hardening and Tempering a Rigid Frog Point as It Was Partly Immersed in a Bath of Soluble Oil. Below—The Light-Colored Portions of This Frog Have Been Flame-Hardened

the application of the weld metal, and the normalizing of the weld.

In one of the generally-accepted procedures for butt-welding rail ends, the ball of rail is scarfed by a cut, started 1¼ in. from the end of the rail, which is carried down on an angle of about 40 deg. in such a manner that it emerges at the rail end at the junction of the web and the ball. To scarf the web, cuts are made from both sides, starting at the top, on angles of 30 deg. so that the line of intersection will coincide with the center of the web. In scarfing the base, the cut is started at the outer edge and is carried in toward the web, being made downward from the top of the base at an angle of 30 deg. All slag and scale produced in the scarfing operation are removed with a grinder or cold chisel. Finally, the rails are lined up with a straight edge, being so arranged that they are separated by a gap of ¼ in.

In making the weld, the first step is to start at the juncture of the base and the web and weld up one side of the web to the ball, then welding the other side of the web in the same manner. Next the base weld is made, starting at the junction of the base and the web and working out toward the edge of the base. As the final step, the head section is welded, this portion of the weld being peened with a hammer as the work progresses. When the weld has been started it should be completed without interruption. Upon completion of the weld, the entire rail section for a distance of three or four inches each way from the joint is heated to a temperature of about 1,000 deg. F., after which it is covered with ground asbestos to cause it to cool slowly.

Repairing Wheel Burns

As a result of the large expansion in traffic that has occurred since the war started, there has been a substantial increase in the development of wheel burns in rail with the result that, in view of the shortage of new rail for replacement purposes, it has become increasingly desirable to make repairs to driver-burned rails so that they may be continued in service. In the formation of wheel burns, the friction between the spinning driver and the surface of the rail causes the latter to be heated to a temperature as high as 1,500 to 2,000 deg. F. for a shallow depth over a small area. The quick and drastic quench supplied by the cold steel surrounding the small area causes the hardness of the steel to be raised from the normal range of 275-300 Brinell to as high as 750 Brinell, with result that the area becomes exceedingly brittle.

After the streaks of blue have disappeared the burns appear as brightly polished spots from one to three inches in diameter. If the burn is discovered at this stage and is not too deep, it may be caused practically to disappear by heating it to a temperature of 800 to 900 deg. F. with a torch, thereby effecting an annealing action. If, on the other hand, the burns are not so treated and are subjected for any length of time to the blows of passing wheels, the hard areas shatter and eventually separate from the parent rail, leaving a depression from 1/32 to ¼ in. deep.

A recommended procedure for repairing driver burns by welding involves, first, the chipping out of all loose and blistered material with a cold chisel and hand hammer, and the thorough cleaning of the depression with a wire brush. The cleaning procedure is completed by a "quick" operation with a regular welding torch with a single-flame bulbous tip, which, at the same time, anneals the hardened area around the cavity. The surface of the metal in the cavity is then heated to a cherry red color and the torch removed quickly, the purpose being to cause any fractures to reveal themselves through their overheated edges. If any such defects become evident, they may be eliminated by washing out the metal to the bottom of the fractures, but if a fracture has progressed to a considerable extent, the rail should be replaced.

Minimum Heat Needed

After the foregoing preliminary work has been completed, the depression is filled as soon as possible by welding, using the same rod that is employed in rail-end welding. In the welding and the preliminary heating operations, it is important that the heat introduced into the metal be kept to a minimum consistent with efficient welding in order to prevent any distortion of the rail. For this reason, if no grinder is available, it is preferable to smooth the weld with a flatter and a sledge hammer, rather than to wash it with the torch. No quenching or heat-treating operation should follow the building up of a burned spot.

Another illustrative, though incidental, example of the use of the oxy-acetylene torch in maintenance-of-way repair work is the welding of broken main filler blocks for open-hearth steel crossing frogs. In one instance of this type the broken ends of each block were scarfed on each side to an angle of 30 deg. in order to form a V when they were placed in position for welding. After the scarfed surfaces had been cleaned with a grinder, the butt-weld in each block was made by two operators working simultaneously. In this way each weld was completed in about an hour. After all the blocks had been welded, they were placed in a forge and the areas around the welds were heated to a temperature of 1,200 deg. F. Finally, they were placed in an asbestos bath and allowed to cool slowly.

Flame-Hardening

The need for making rail last as long as possible, which has become more urgent than ever during the war emergency, has brought about an increase in the practice of flame-hardening rail ends to reduce wear. To date, rails are hardened at the ends only, except, perhaps, in a few instances where the expense of hardening the running surfaces of rails for their entire lengths has seemed justified by their inaccessibility for replacement or for other reasons.

A comparatively recent development is the simultaneous flame-hardening and tempering of frogs. The process involved is somewhat more elaborate than that required in hardening rail ends. In a set-up that was used to harden and temper a rigid frog point, the frog was immersed in a soluble oil solution up to the underside of the ball. This was done so that the body of the rail would remain cool, thereby controlling warping. The flame-hardening torch and tip,. mounted on a carriage, was then passed over the surface to be hardened, being followed closely by a quench of soluble oil. Mounted on the carriage behind the oil quench was a ⅜-in. steel plate with a 15-lb. blast of compressed air blowing against it, the purpose being to keep the solution from working behind the plate and to control the time during which the rail was subjected to the quench.

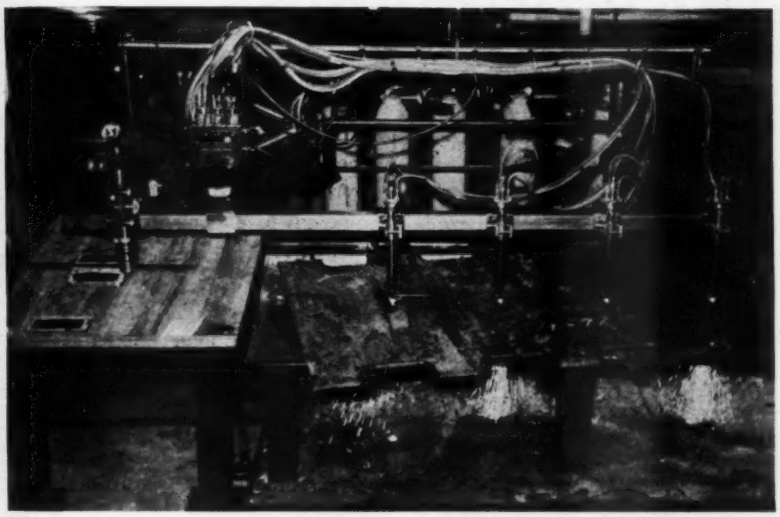
Behind the air dam on the carriage was mounted a second torch with a medium intensity multiflame tip, the function of which was to draw the metal in the treated zone to the desired degree of the final hardness. Soluble oil is considered preferable to water as a quench where limited amounts of heat are imparted to the metal, the reason being that the oil permits of more accurate control. The simultaneous flame-hardening and tempering process has proved successful and the hardening of the entire surfaces of spring-rail frogs is now also under consideration.

Still another practice that has come into wider use during the emergency is the reclamation of worn or broken hand tools by welding, this being true because many such tools contain critical elements and it has been difficult

to replace them. Also, as a conservation measure, some manufacturers have adopted the practice of supplying only the head of the tool with part of the handle, which is welded by the user to the hold handle from which the head has been cut.

Shop Fabrication

The material shortages that have prevailed during the last two years have raised the necessity on many roads of fabricating certain items in their own shops, using second-hand materials to a large extent. From the point of view of the track man, the fabrication of frogs is perhaps the most interesting phase of this work. On one road which fabricates part of its frog requirements in its own shop, an irregularly-shaped base plate is used which permits full-plate bearing on the ties but which incorporates U-shaped recesses between the ties to facilitate tamping. For cutting these plates a machine embodying four torches was used, in which the torches were guided by a tracing mechanism. To hold the plate firmly in position, dowel pins were inserted in holes in the cutting table and the plate was butted securely against them. On this job, an operator and a helper cut 32 plates in a nine-hour day.



Using a Multiple Machine Torch to Cut Base Plates for Frogs

In another instance, a rail crossing of new 90-lb. rail was fabricated from filler blocks, bolts, and corner braces salvaged from an old crossing. This job required considerable reshaping and repositioning. As the angle of the new crossing was 7 deg. larger than that of the old, the corner braces had to be bent to the new angle. Since this changed the position of the bolt holes in relation to the holes in the filler blocks, these holes had to be plug-welded and redrilled. Also the fillers of the wings had to be cut off to the new angle.

The new control-cooled rail that was used in building this crossing was drilled to fit the holes in the filler blocks and laid to form a double-rail crossing. Normally, the base of the outside rail is machined to fit over the base of the running rail. Since facilities for doing the work in this manner were not available, all shaping was done with the oxyacetylene torch and the surfaces were finished with a small flexible-shaft grinder. To prevent the warping of the rails and guard rails, the cuts were made in 12-in. increments with 12 in. of uncut metal between each two cuts. The rail was cooled before the intervening piers were cut. The construction of this crossing was attended with such success as to lead to a considerable program of similar frog work.

Welding Guard Rails

In another instance, oxyacetylene processes were used to expedite the installation of spring-rail frogs where a problem had been created by the inability to secure the required 11-ft. 112-lb. guard rails. To solve this problem an 8-ft. 3-in. guard rail was cut in half and a 2-ft. 9-in. section of rail was inserted between the halves, being butt-welded to the end pieces. Units that were compounded in this manner were as serviceable as regular 11-ft. guard rails.

Originally, it was universal practice to fasten spring-type frogs to their base plates by welding, but to a considerable extent this method has been supplanted by riveting. In one design now in use, five plates are bolted to the wing rail on one side and then welded to the base plate. The hold-downs on the opposite side of the frog are welded to the base plate.

In fabricating track materials, increasing use is being made of the oxyacetylene cutting machine. Guided either by hand or by a magnetic tracing device following carefully measured templates, the machine will cut intricate shapes of almost any size and any commercial thickness. Several examples of the use of the machine torch in fabricating maintenance of way materials have already been cited. In still another instance, involving the fabrication in a railroad shop of a large quantity of tie plates with rail braces attached, a four-torch machine was used to cut out the braces on a mass-production basis. After finishing, the braces were then welded to the plates by means of the electric-arc process.

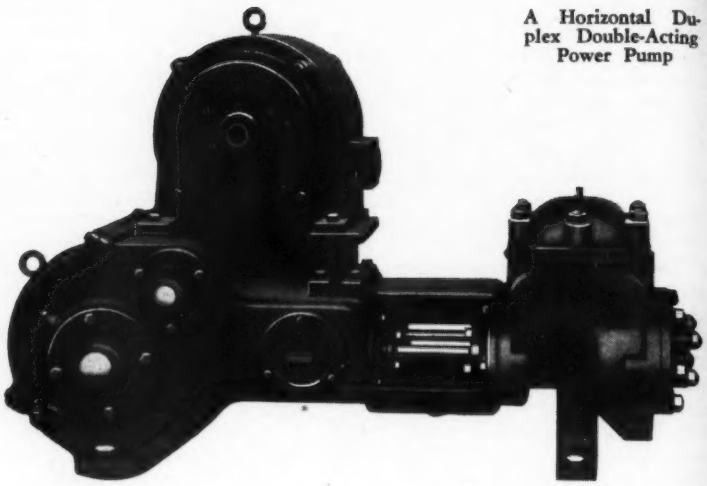
Flame Cleaning

Another oxyacetylene process that is finding increasing application in railway maintenance work is that known as flame-cleaning. In this process steel surfaces are brushed with "brooms" of oxyacetylene flame, using torches especially designed for this purpose. When applied to metal surfaces, this process removes all dirt and loose paint, expels occluded moisture and, where painting follows, makes possible an intimate bond between the paint and the surface. The paint should be applied while the metal is still warm and before any moisture has had an opportunity to condense upon it. Rust formation is thereby prevented or greatly reduced.

An example of the efficacy of this method is provided by a case involving a semaphore signal that was painted several years ago. When this work was done, the mast was flame-cleaned before painting, and on this part of the structure the paint is still intact. On the other hand, the control box was simply wire-brushed before painting for fear of destroying the weather-seal between the mast and the box. Already the paint on the control box has started to blister and peel.

It is apparent that, in adapting oxyacetylene processes to the solution of many of the intensified problems involving materials that are confronting them today, maintenance men have proceeded with ingenuity and enterprise. It is equally apparent that the knowledge and skill that have been gained in coping with their wartime problems will find wide application in the uncertain days ahead.

Maintaining Water Service Facilities



A Horizontal Duplex Double-Acting Power Pump

The Maintenance of Pumps

By C. R. Knowles

Superintendent Water Service (Retired)
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No. 5 of a Series

This article describes the types of reciprocating pumps that are used and the service for which they are best adapted. The troubles most frequently encountered by maintainers and operators are discussed in detail, including pump packing, valves, pounding pumps, etc. Other articles on the maintenance of pumps, to appear later, will discuss centrifugal, deep-well and miscellaneous types of pumping equipment

ALL types and kinds of pumps are used in railway water service, from the simple hand pumps in station, section house and stockyard wells, to large installations capable of supplying the water required by a city of 100,000 or more population. It is estimated that 146,000 pumps of all kinds are employed in railway water service. These pumps may be grouped in two general classifications, displacement and centrifugal pumps. They may be further classified between surface and deep well pumps, and between direct-acting and power pumps, depending upon the manner of application of the power.

The term "direct acting" is applied to steam pumps of the positive displacement type in which both the steam and water pistons are mounted on the same rod and operate independent of cranks or cams.

A power pump is one that is driven by power units independent of the pump itself, as, for example, an electric motor or an internal combustion engine. It may be either a displacement or a centrifugal pump. When used for driving a reciprocating displacement pump, the rotary motion of the power unit is converted to reciprocal motion by means of a cam or crank mounted on a shaft, the power being transmitted directly by a coupling, or by means of a belt and pulley or through gears. Where it is necessary to adjust the speed of the pump to that of the power unit, this is accomplished through speed reduction gears, or a pulley of the required size.

Surface pumps include those in which the pumps as well as the power unit or other actuating force is located above the water level. Deep well pumps are placed below the water level in the well or other source of supply, with the power unit located on the surface and connected to the pump by means of a rod or shaft. This latter type of pump is adapted to use with surface supplies where the level of the supply varies between wide limits, thus avoiding the necessity for the deep pit that would be required for the conventional type of horizontal pump.

Other devices employed in handling water include hydraulic rams, air lifts, siphons and jet pumps. In the strict sense of the word, the latter cannot be designated as pumps and they are not adapted to general use in railway water service, although they are used to some extent under special conditions.

The maintenance of pumping equipment does not require a profound knowledge of hydraulics or of the design and construction of pumps, but it does call for some familiarity with the basic principles of hydraulics, and with pump construction in order to know what to look for if a pump fails to function properly. Maintenance begins with the operation of the pump; lubrication, packing and ordinary running repairs, such as replacing valves, springs and stems, and the adjustment of moving parts, are part of the operator's duties. Cleanliness is important in maintenance of pump equipment.

Reciprocating Pumps—Most Widely Used Type

Both direct-acting steam pumps and power driven reciprocating pumps are widely used in railway water service and for some pumping conditions they are difficult to replace. The reciprocating pump has a greater flexibility over a wide range of delivery and pumping heads than any other type of pump; it also fluctuates less in pumping efficiency. Unlike other pumps, where the speed and rate of delivery are fixed within narrow limits, it functions at all speeds and rates of delivery within its range. Its popularity with both pumpers and maintenance men is due to its comparative

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simplicity of construction and maintenance, together with its unusual flexibility of operation.

Description

A reciprocating pump is one in which a piston or plunger moves back and forth in a cylinder, alternately pulling the water into the cylinder on one stroke and discharging it on the return stroke. It may be either single or double acting; a single-acting pump discharges the water with the piston moving in one direction only, while a double-acting pump discharges the water as the piston moves in each direction. Suction and discharge valves are provided at the inlet and the outlet of the cylinder which open and close automatically with the movement of the piston. Reciprocating pumps most widely used in railway water service are direct-acting steam pumps, but triplex and duplex power pumps are also used quite extensively.

Steam Pumps

The direct-acting steam pump predominated in railway water service for many years, and no other pump has equalled it for all-round flexibility, simplicity and reliability. Although many of them are still in service, they are being supplanted gradually by centrifugal pumps because of their lower cost, greater adaptability to use with electric motors and automatic control. Direct-acting steam pumps are of the positive displacement type, with both the steam and the water pistons connected to the same rod, and are distinguished from other types of steam pumps by the absence of cranks and fly-wheels.

A simplex direct-acting steam pump has only one steam piston and one water piston, while a duplex direct-acting pump has two steam and two water pistons. In both pumps, the water pistons are double acting. The principal advantage of the duplex over the simplex pump is that it produces a more uniform flow of water, particularly when operated at low speed. This type of pump is too well known to require a detailed description. It is built in many different types and sizes but all of the models operate on the same general principle.

Power Pumps

The term power pump as used here refers to a positive displacement reciprocating pump operated by a crank and connecting rod through power applied to the crankshaft. It has a constant speed and therefore does not have the flexibility of a steam pump. A steam pump will slow down if the discharge head increases for any reason and if the discharge is completely closed, it will stall or stop, while a power pump will continue to build up pressure, often to the point where serious damage may result as, for example, burning out the motor under the overload or causing a break in the discharge line. As a safety measure, a power pump of the positive displacement type should always be provided with a relief valve to prevent destructive pressure. It is always desirable also that it be provided with air chambers on both the suction and discharge lines to compensate for the surges in these lines.

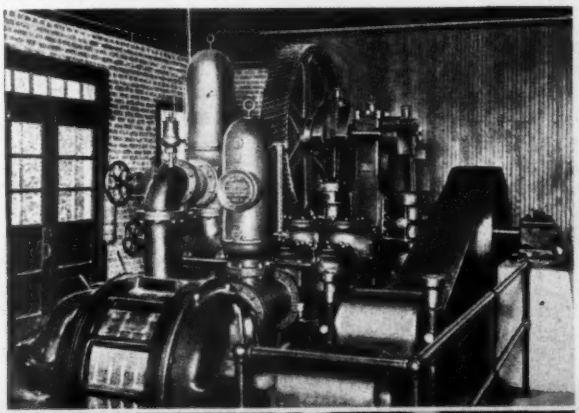
A power pump may be either vertical or horizontal. The vertical is commonly a triplex pump having three cylinders, and the horizontal a duplex having two cylinders.

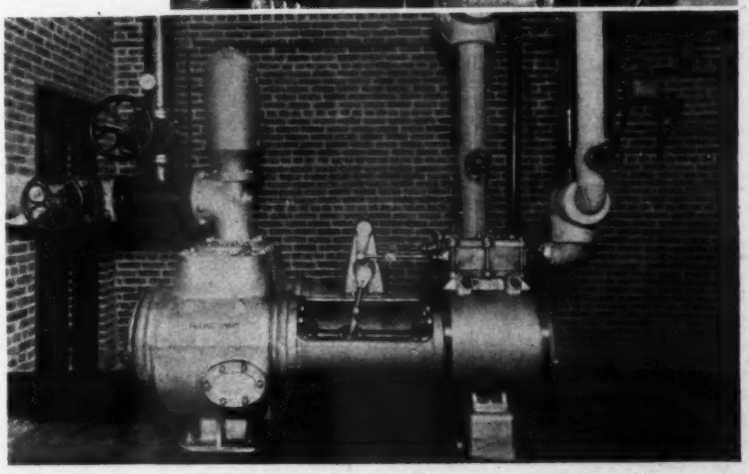
A triplex pump may be either single or double acting, while a duplex pump is almost always double-acting. A double-acting pump has about twice the capacity of a single-acting pump with the same piston diameter and stroke.

The problems confronting the water service repairman in the maintenance of the water end of different types of reciprocating pumps are practically the same, regardless of the method of power application, as they are all dependent upon the satisfactory operation of the piston and valves, and upon the condition of the suction and discharge piping as affecting the water delivery to and from the pump.

Packing

An experienced water service repairman soon learns that good pump performance depends very largely on the condition of the packing. In the first place, he recognizes that the correct packing should be used and applied correctly. Inside packed piston pumps are usually packed with what is termed square canvas or duck packing, consisting of layers of woven cotton fiber combined with rubber. Various grades of packing are used, including soft rubber packing for cold water and fairly low pressures; medium hard packing for cold water and high pressures, and "rock hard" packing for hot water and high pressures. Outside-packed plunger pumps are provided with similar packing or in some cases with a braided flax or cotton packing impregnated with graphite. The pump manufacturer's recom-





Right—A Typical Installation of a Belt-Driven Vertical Triplex Pump. Below—A Direct-Acting Duplex Steam Pump

mendations are based upon exhaustive tests and should be followed as closely as possible.

The operator should keep the stuffing boxes or pistons well filled with evenly-placed packing of the right size; he should not crowd in oversize packing or attempt to make smaller packing fill the packing space, for in either case it will destroy the efficiency of the packing and invite leaks and poor operation. Furthermore, the packing should not be too tight, for this will cause loss of power and may score the plunger or liner and necessitate its more frequent renewal.

Packing should be examined occasionally and adjusted or renewed as required. Outside-packed plungers may be lubricated with oil or grease, but inside-packed pistons depend upon the water for lubrication.

Piston rods require good spiral packing of the correct size. Graphited packing is always preferable for pump pistons and, as with plungers and liners, the use of flax packing should be avoided where a bronze rod is used, because of its scoring effect on the rod. Rod glands should be pulled tight to seat the packing properly and then released to avoid undue friction. A piston rod stuffing box will not leak when the gland nuts are only finger tight if it is packed properly.

An important feature for a water service repairman to bear in mind in packing pumps is to use the right tools. A tamping tool should be used to force the packing into place. Socket wrenches should be used when packing inside pistons and open-end wrenches should be used when packing outside packed plungers and rods. It is rarely possible to do a good job with a stillson or monkey wrench.

Valves

The water service supervisor recognizes that the efficiency of pump valves depends very largely upon the selection of the right valve for the service. Next in order, but of equal importance, is the condition of the seat and stem. The lift of the valve and the tension of the spring are also factors affecting the life and efficiency of the valves.

Rubber pump valves are made in several grades, ranging from soft rubber valves which are suitable for cold water and relatively low pressures, to hard rubber valves for hot water and high pressures. Soft to medium-soft rubber valves are suitable for use in ordinary tank service, when cold water is handled by the pump and where the pressure does not exceed 50 lb., since they form a better seat under low pressure than hard rubber valves. Furthermore, they are less subject to wear where the water carries sand or grit.

On the other hand, soft rubber valves are subject to disintegration and other damage under higher pressures. They also soon become worthless if used in hot water service. It is not at all unusual to find soft-rubber valves pushed partly through the valve seat and ruined in a short time when they are used in pumps handling hot water. This happens most often if they are installed in pumps that are used in boiler-feed service or for boiler washing.

It is an equally serious mistake for a repair man to use valves designed for hot-water service in a cold-water pump, because they will have the same effect as a metal valve, creating undue wear on both the valve and the valve seat, so that it will be difficult to maintain a tight seat. Medium hard-rubber valves should be used in high pressure pumps, but they should always be provided with well-fitting valve plates, preferably of brass or bronze.

In this connection, it is advisable to use plates on all rubber or composition pump valves, because they prevent the distortion of the valve and wear from the springs. Valve plates also make it practicable to use thinner valves, such as valves that have been resurfaced. Another advantage of valve plates is that when the seat face of the valve has become worn, the valve can be turned over and reused.

The repairman should see that the stems fit the holes in the valves snugly. If the fit is loose, the hole will wear rapidly because of the motion between the valve and the stem, thereby allowing the valve to leak or shift so that it seats improperly. The length of the valve stem and the tension of the spring should be so adjusted that the valve will have the correct lift. Either too much or too little lift of the valve will increase the rate of wear, for with too much lift, the valve strikes the seat with unnecessary force in closing, while if the lift is not sufficient, the water-way will be restricted and friction will develop between the valve and the valve seat.

Composition valves are usually reinforced with a fabric of some kind, and are tougher than rubber valves, but they do not possess the same resiliency. The same care should be given valves of this type as is given rubber valves, for they are subject to the same form of wear and damage.

Metal valves have been used in some instances but they cannot be recommended for general use, even in hot water, as the metal-to-metal wear on the seats is excessive because of the hammer effect which is always present in pump valves. These comments do not apply to metal valves with rubber or composition faces, for they are being used successfully in many cases.

Pump valves are, as a rule, difficult of access, and maintainers should provide special wrenches for renewing valves and seats, as this will greatly accelerate the work of maintaining them in good working condition.

Pounding Pumps

Most troubles with the water ends of pumps are evidenced by certain sounds, usually resembling pounding noises, which come to be recognized readily by the experienced water service man. This pounding may result from suction difficulties or from mechanical defects in the pump. One of the principal causes of pounding is the restriction of the flow through the suction line, which does not permit the cylinder to fill and creates a partial vacuum. This may result from the suction lift being too great, the suction line too small or from obstructions in the suction line. The suction lift should be well within the suction limit. The maximum theoretical suction lift is approximately 34 ft. at sea level; however, the suction lift of a reciprocating pump should not be more than 23 ft. if it can be avoided.

The suction line should always be large enough to permit the delivery of the required amount of water to the pump without undue friction losses. It is good practice for the suction pipe to be at least one size larger than is called for by the maximum delivery of the pump, and even larger sizes are desirable where there are a number of bends or where the suction line is very long. The friction in a 90 deg. elbow in a suction line is equal to about six feet of straight pipe. Air chambers are desirable on long suction lines to take care of shocks resulting from surges in the water.

Air leaks in the suction line, through the rod stuffing box or a defective gasket on the water end, will also cause pounding sometimes. All possible sources of air leaks should be investigated, followed by corrective measures where necessary.

Among the mechanical defects, obviously the most important for the maintainer to check is the condition of the suction and discharge valves; missing or badly worn valves and broken or weak valve springs may cause a pump to pound badly and will greatly decrease the efficiency of the pump.

The manner in which the pump is packed may also affect the tendency of the pump to pound or hammer. For

example, if the piston on one side of a duplex pump is packed tighter than on the other side, the increased friction on the tightly packed side may slow the movement of this piston and result in uneven or short stroking.

The improper setting of steam valves also contributes to pounding because of the uneven stroking of the pump. In extreme cases, improperly-set steam valves may result in pounding because the piston strikes the cylinder head. The remedy is to reset the valves to insure smooth, even operation.

Again, pounding is sometimes caused by allowing the pump to become air-bound. When air is present in the water cylinders of a pump in operation, it is alternately compressed and expanded, thus preventing the cylinders from filling with water. A condition of this kind will invariably result in uneven stroking and, therefore, pounding. This can be overcome by the pumper exercising care to see that the pump is properly primed when it is started and by preventing air leaks.

The Steam End

The steam end of a direct-acting pump seldom gives the operator any trouble if it is properly operated and well-lubricated. The principal faults in the operation of a pump of this type are the failure to drain the water from the steam cylinders before starting, and running the pump too fast. If the water is not drained from the cylinders, it may break the steam rings or blow out the cylinder heads, and will certainly destroy the lubrication in the cylinders. The cylinder cocks should be opened when the pump is shut down and allowed to remain open until after the pump is started again, for the admission of steam to the cylinders when they are cold causes the steam to condense and the water thus formed will tend to completely wash away the lubrication if it does no other damage.

It is often the practice of operators to run the pump very fast when starting, in an effort to make it pick up the water without priming, or to overcome the result of poor priming. This is very poor practice for it throws excessive strains on the pump if it does not break the rocker arms, links or other moving parts. Under no circumstances should a pump be operated in excess of its maximum rated speed, which is never in excess of 64 complete revolutions per min.

Lubrication is an important detail of operation that is all too often neglected. Although poor lubrication will not always put a pump out of commission as quickly as some other defects, it will cause excessive wear, particularly on the steam cylinder, rings and steam valves and seat. Wear resulting from inadequate lubrication can be detected readily by an experienced pumper by observing the pump exhaust. While a direct-acting steam pump without fly-wheel will take steam throughout the full stroke, there will be a fairly sharp cut-off at the end of each stroke if the cylinder and valves are in good condition. On the other hand, badly worn cylinders, rings and valves are accompanied by a steady, continuous, almost unbroken stream of steam from the exhaust.

The Water Service Series

Articles published previously, of which this is the fifth, include:

(1.) Introduction (April issue)
(2.) Sources of Supply—Streams, Lakes, Springs and Reservoirs (May)
(3.) Sources of Supply—Wells (June)
(4.) Sources of Supply—Pollution of Wells—Intakes, Suction Lines, Pump Pits, Ice (July)

Every steam pump should be provided with a sight-feed lubricator placed in the steam line as near the pump as practicable. This lubricator should be maintained in good condition, and the pumper should see that they are filled at regular intervals before the supply of oil in the lubricator is exhausted. A good cylinder lubricating oil should be used, as ordinary oils break down and become worthless as lubricants when subjected to the heat of the steam.

The steam valves of a duplex pump must be set correctly to secure the maximum length of stroke in each cylinder and to prevent the pistons from striking the cylinder heads. There must be sufficient lost motion between the nuts on the valve stem or in the connecting links to allow the valve part to remain open for the greater part of the stroke. This permits one piston to make the full stroke before the valve is reversed, thus admitting steam to the other cylinder. Too little lost motion in steam valves will cause short-stroking, while too much may result in the piston striking the cylinder head.

To set the valves of a duplex pump, the repairman must adjust the lost motion between the valve stem and the valve so that when the stroke of the piston on one side of the pump has been completed, it has moved the valve of the other piston to its extreme position in one direction. The piston should then be pushed to the other end of the stroke and the valve adjusted as before. This procedure should be repeated for the other side of the pump. To equalize the lost motion, the valve must be moved each way until it strikes the valve stem nut, thus making both port openings equal.

The valve motion, consisting of the cross-heads, rocker arms, rocker arm shafts and bearings, links and pins, should be inspected at regular intervals for lost motion resulting from excessive wear, and new bushings, pins or bearings applied when they are worn to the extent that affects the efficient operation of the pump. They should be well lubricated at all times and bolts, nuts and other connections kept tight with the proper tension.

General

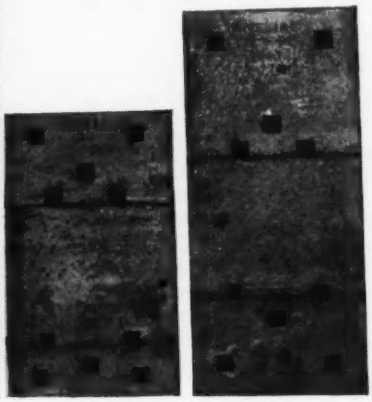
The water service repairman should take great care when moving the pistons and rods of pumps when making repairs, packing the pumps or setting the valves, for damage often results from the use of pipe or other improvised bars for this purpose. A square bar, similar to a track lining bar, should always be used for this purpose. If blocking is required, wooden blocks should be used instead of metal.

Cleanliness is essential to the efficient operation and maintenance of pumps. Unfortunately, many pumpers overlook this feature, especially when operating steam pumps, for they seem to be particularly susceptible to dirt. As a result, steam pumps are often permitted to become caked with oil and dirt to the extent that it is difficult to detect a possible defect. A pump should be kept free from surplus oil, for it collects dirt and dust, and unless it is removed as it collects, it is baked on by the heat of the steam cylinders. It is a good practice, that should be followed universally, for the pumper to wipe the pump daily, or more often if required, with waste or a cloth.

The pump should be kept well painted, both for appearance and to protect it against corrosion. Drip pans are desirable to collect waste oil or water. The pans should be provided with drains wherever possible, and kept clean. An accumulation of water around the pump should be avoided as it not only creates an unsightly condition, but makes the maintenance of the pump difficult and disagreeable. Good operation includes good housekeeping and both play an extremely important part in good maintenance of all types of pumps.

N. & W.

Left—This View Shows How the Track Appears After the Large Tie Plates Have Been Installed. Below—For Comparison, One of the 18-In. Tie Plates Is Shown Beside a 13½-In. Plate



Left — Removing the Old Tie Plates in Preparation for Inserting the Large Ones. Adzing Machine in Background. Below — The Adzing Machine Consists of a Power - Driven Tie Scorer Specially Adapted for This Work

WHAT is probably the largest and heaviest tie plate in regular use on any railroad in the country is now being employed on the Norfolk & Western to protect the ties on certain curves in heavy-traffic territory. Measuring 8-in. in width and 18-in. in length and weighing approximately 34 lb., this plate compares with the 8-in. by 13½-in. tie plate, weighing about 22.6 lb., that is standard on this road for use on lesser curves and tangent track in the same territory and for all locations in lighter-traffic territories. First used in 1940, the large tie plate is now also standard for use on all bridges on the main lines and some secondary main lines.

Since 1932, rail of the 131-lb. R. E. section has been standard on the N. & W. for main-line track. Prior to 1936, the company used an 8-in. by 13½-in. single-shoulder tie plate in such tracks, but in that year a double-shoulder tie plate of the same dimensions was adopted as standard for use with new 131-lb. rail and with relay rail under certain conditions. This plate is punched with four holes for hold-down spikes, four for line spikes and two for spiking flanged joint bars. Generally, it was the practice to full-spike the tie plates on sharp curves and to apply two hold-down and two line spikes to each tie plate on lighter curves and tangent track.

Owing largely to the fact that it

Adopts Giant Tie Plate for Use at Severe Locations

Longer life is being obtained from crossties on sharp curves in heavy-traffic territory on this road through the use of a tie plate 18-in. long, which was first introducted in 1940. Among other things, this article gives the characteristics of the new plate and the reasons for its adoption, tells where it is used, and describes the procedure employed when inserting it in track

originates considerable coal traffic, the N. & W. is a heavy-traffic road, and in recent years the load carried by some sections of main track has ranged as high as 55,000,000 gross tons annually. Moreover, since the territory of heaviest traffic is located in a mountainous region, there is a considerable amount of curvature, with some curves as sharp as 12 deg. This combination of conditions results in relatively high lateral wheel thrusts on the sharper curves, with the consequent necessity of restoring the gage at frequent intervals. A natural outcome is the spike-killing of the ties, an occurrence which, because it reduces the holding power of the wood, makes it even more difficult to maintain the proper gage. Another type of mechanical wear that was experienced on a considerable scale with the 13½-in. tie plate was the plate-cutting of the ties on the low sides of curves to such an extent as to shorten their service life materially.

As a means of protecting crossties on curves in heavy-traffic territory, consideration was given to the possibilities of using a larger tie plate. It was reasoned that if a tie plate were to be developed of sufficient length to permit the hold-down spikes to be driven in sound wood, thereby bridging the spike-killed areas, many years of additional service life could be obtained from ties that would otherwise have to be removed from the track within a relatively short time. Moreover, when used with new ties, the larger tie plate, with its greater bearing area, would make it possible to obtain more nearly the potential maximum service life from such ties by reducing or eliminating plate cutting.

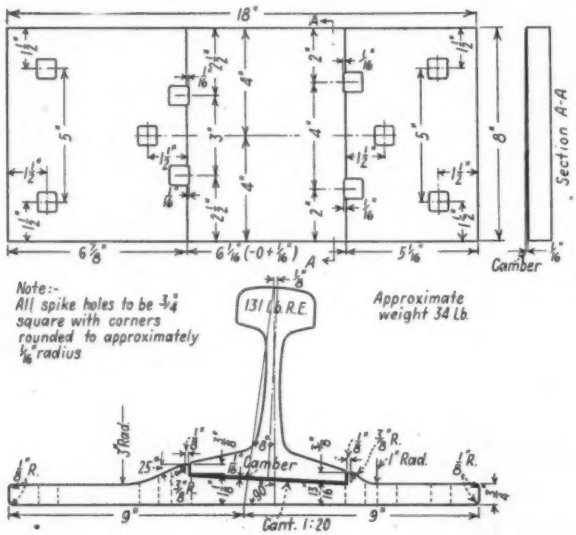
Acting on this reasoning, a design was developed for a new double-shoulder tie plate 8-in. wide, 18-in. long and ¾-in. thick, which is 4½ in., or 33 per cent longer; 36 sq. in., or 33 per cent, larger in bearing area; and 11.4 lb., or 50.5 per cent, heavier than the 8-in. by 13½-in. plate. The new plate has a cant of 1:20, a camber of 1/16 in. and is flat on the bottom. It is punched with 10 spike holes, including 4 for hold-down spikes. 4 for line spikes and 2 for spiking flanged joint bars.

First Installed in 1940

The first of the large tie plates were installed in 1940, the intention at that time being to confine their use to the sharper curves in the territories of heaviest traffic, but since then the instructions governing their use have been considerably liberalized. Specifically, the first instructions governing the installation of the large tie plates, which were

Showing Several of the Operations Entailed in the Installation of the Large Tie Plates, Including the Cutting Off of the Tie Plugs, the Painting of the Adzed Surfaces With Creosote and the Placing of the New Tie Plates Under the Rail Which Has Been Lifted With a Jack

issued early in 1940, authorized the purchase of 50,000 of the plates for insertion only on the low sides of curves of 9 deg. or more in certain heavy-traffic territory. A short time later, however, authority was extended to install the large tie plates on both sides of all curves of 6 deg. and over in certain territories, and an additional 150,000 plates were obtained for this purpose for installation in 1940. The territory covered by this authorization included that portion of the eastbound main line between Kenova, W. Va., and the eastern terminus of the road at Norfolk, Va., a distance of 526 miles, and that portion of the westbound main line between Roanoke, Va., and Columbus, Ohio, which is a total distance of 410 miles.



Plan and Side View of the New 18-In. Tie Plate

Its Use Again Extended

In July, 1941, the instructions were broadened still further to authorize the installation of the tie plates on curves of 4 deg. and over in the eastbound main track between Portsmouth, Ohio, and Norfolk, 565 miles; on curves of 6 deg. and over in the eastbound main between Portsmouth and Columbus, 98 miles; and on curves of 4 deg. and over in the westbound main between Roanoke and Columbus. There is, moreover, a relatively short length of track in the eastward main line in which the instructions permit the installation of the 18-in. tie plates in curves of 1 deg. and over. This is the nine-mile section between North Fork, W. Va., and Coaldale, where there is a ruling grade of two per cent ascending to the Elkhorn tunnel at the summit of the Alleghany mountains. Because of this heavy grade, much sand is used resulting in abrasive action under the tie plates. Train speeds and super-elevation comprise another factor affecting the wear of ties in this territory, which is electrified. Freight trains ascend the grade at a speed of about 14 miles per hour, while the speed of passenger trains is approximately 28 m.p.h. Since the curves are super-elevated for passenger-train speeds, the load imposed by slow-moving freights on the low rails of curves is unusually heavy. For these reasons the use of the large tie plates was extended to light curves in this territory.

To date, there has been no further change in the instructions concerning the installation of the large tie plate, except that in August, 1943, authority was issued to permit their insertion on all bridge ties on the main line between Norfolk and Columbus, and on the Cincinnati, Pulaski and Shenandoah districts. The Cincinnati district comprises the 112-mile line between Portsmouth and Cincinnati, the Pulaski district extends 107 miles from Radford, Va., to Bristol, and the Shenandoah district between Roanoke, Va., and Hagerstown, Md., a total distance of 239 miles.

Installation Policy

Generally speaking, the policy has been to insert the large tie plates on curves sharper than 6 deg. in the designated territories as rapidly as possible without necessarily waiting until such time as the work could be done in conjunction with rail renewals. On curves of 4 deg. and up to 6 deg., however, the tie plates are being changed out only in connection with rail-laying work, and hence it will be some time before all such curves in the designated territories will have been equipped with the 18-in. plates. Since these plates are considerably thicker than the 13½-in. plates, it is not the practice to insert them on new ties when making tie renewals in territories where they are standard but have not yet been installed; to do so would create an undesirable condition when the large plates are later applied out-of-face.

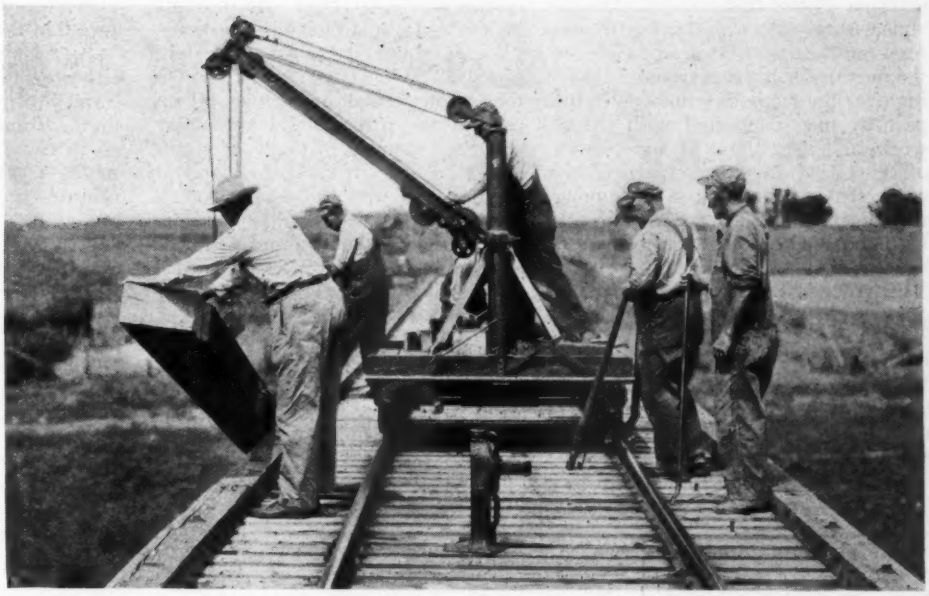
As a rule, the large tie plates are each provided with two line spikes and two hold-down spikes, or eight spikes per tie, except that at locations where conditions are unusually severe the tie plates are each secured to the tie with four hold-down spikes, making 12 spikes per tie. At all curves where the large tie plates are installed they are carried throughout the easement curves, so that they extend from the point of spiral to the point of tangent.

Adzing Is Problem

Where the 18-in. tie plates are inserted in conjunction with the changing out of the rail, there is little to distinguish the work from a normal rail-laying operation; however, where the tie plates are installed independently of any other work and without removing the rail, a special operation is involved. One of the problems connected with this work was that of developing an economical and effective method of adzing the ties as necessary outside the limits of the old tie plates to form seats for the new and larger plates. In other words, the problem was one of providing a means of lengthening the tie-plate seats sufficiently to form bearing surfaces for the longer tie plates at the level of the existing seats.

This problem was solved by adapting to the work a Woolery power-driven tie-scoring machine. Originally designed for scoring ties in the track in preparation for adzing them by hand, this machine consists essentially of a carriage with four flanged wheels, carrying a gasoline engine for driving two cutting heads over one rail, each consisting (in the original machine) of a circular saw blade on each side of the rail for scoring the ties. The work of adapting this machine to the adzing of the ties in connection with the installation of the 18-in. tie plates consisted primarily of applying sufficient additional circular saw blades to the cut-

(Continued on page 715)



The Supervising Officer Must Know the Proper and Safe Method of Doing Work, and Must Show His Men by Example, if Necessary, to Avoid the Possibility of Accidents

Example—Is the Best Safety Teacher*

By R. D. Copeland

Safety Inspector, Wabash
Moberly, Mo.

Discussing safety methods and instruction as they pertain to maintenance of way forces, Mr. Copeland insists that every injury, no matter how trivial, should be a matter of concern; that supervisory officers should talk the language of their men; that any attitude of aloofness must be dispelled; that every rule must be observed by both men and officers; and that example is more effective than preaching

A FEW years ago, the chief of police of one of our larger cities was asked, "When is the proper time to start crime prevention?" to which he replied quickly and aptly, "In the high chair, not the electric chair."

About two years ago when the maintenance of way departments were beginning to experience a heavy turnover in manpower, several of us felt that there would be an increase in personal injuries as the result of the many new men coming on duty—men who did not know the difference between a tie plate and an angle bar. However, within a few months we began to realize that while the number of personal injuries generally was on the increase, they were happening more frequently to men with from three to five years experience, and even longer, and not so frequently to the newer men. Occasionally, when a new man received an injury, it was found that he had not been thoroughly trained in safety before going to work, or that the foreman or assistant foreman in charge had not been instructed properly in the manner in which he should look out for his men.

Every Injury Serious

No doubt, many a supervisory officer who has experienced one, two or three years without a reportable injury has begun to feel that he has the personal injury situation well in hand, only to find a whole flock of personal injuries falling about him almost over night. Only then does he begin to realize that he has not yet found the ultimate solution to accident prevention.

Perhaps an entire division will go from one to three years without a reportable injury, but at the same time will have from 50 to 70 non-reportable injuries each year. I fear that some division officers look upon such a situation entirely too complacently, feeling that so long as reportable injuries are not charged against them, they have nothing to worry about. The fact is that just so long as any personal injuries occur, even though they be no more than pinched fingers, they are potential serious injuries and should cause us serious concern.

It is not enough that we teach the safety rules and assume that our men have a knowledge of them. We must keep pressing home the safety idea, and impress our men with the thought that, to them, individually, safety is of the first importance in the discharge of their duty. We should make it clear that the safety effort of the railways is not set up or to be practiced on a selfish contest basis, but rather on a humanitarian basis. We must make our men feel that they and the members of their families receive far greater benefit than anyone else on the railroad from constant vigilance in safe practices. Only when they have become saturated with the idea that they must be guarding against danger at every turn, have these men become accident conscious. When that takes place, we can feel that we have started to pull our feet out of the quicksands of the well-intended but superficial efforts of the past, and are

* An address presented before the Central States Safety Congress in Kansas City, Mo., on June 7.

at least headed in the right direction.

What is the best method for the supervisory officer to pursue in impressing the importance of safety on the men under his supervision? Looking over the methods employed in the past by men connected with safety work, and over those of supervisory officers who have been particularly successful in promoting safety among their men, we can see great similarity with those employed by the greatest teacher of men, who lived more than 1900 years ago. He walked along the dusty paths and up the rocky slopes in His native land. He stopped and talked with people as He met them. He talked with the educated as well as with the illiterate, and in terms they could easily understand. He taught His lessons by means of parables, drawing pictures against the homely background of their surroundings. He did not elect to stand on a raised platform and look down at people. He did not have the advantages, or perhaps the disadvantages, of a microphone. On the contrary, He went out and mingled with the people and talked with men, not at them.

Perhaps some supervisory officers who have had the benefit of technical educations exercise a feeling of aloofness or superiority over the men under their supervision. If such should be the case, that feeling must be dispelled at once. As a supervisory officer, I must realize that to make my men feel the humanitarian side of the safety movement, I must go to the inconvenience of leaning down and crawling through the old barbed wires of the right-of-way fence to stand on the same ground with them. I cannot talk to them in technical terms.

If I meet a man working with a No. 2 track shovel, I cannot talk to him about the superelevation of curves or about frog angles. If I meet a carpenter in a bridge and building gang with a sweaty shirt on his back and his hands and overalls stained with the creosote from the material he is handling, I cannot speak to him about over-turning moments or stresses in steel—I must talk to him in his everyday language. If I come upon a section crew which refers jokingly to the spike puller as "the roadmaster," then I, as a track supervisor, or the roadmaster as he is called on some roads, will not lose face with those men if I also refer to the spike puller as "the roadmaster." If John eats a sandwich with lunch meat between two slices of bread, I can also eat a sandwich of the same type.

I recall a supervisory officer several years ago who, in the spring of the year, wished to know the condition of the track level boards on each section on his territory. Accordingly, he put out the following question—"What is the status of your level boards?" When the replies came in they showed that more than 60 per cent of the foremen did not understand the meaning of the word status, and that officer threw up his hands in disgust. He did not even stop to think that he was at fault. We must realize that many of our men may never have had the advantage of a grade school education, not to mention that of a high school or university. We may feel that because of his lack of education he is a slow thinker and not quick to perceive the ideas of safety, yet that man may develop into a quick thinker and be one of the safest workers in the gang.

Insist on Rule Observance

As a supervisory officer, I must be firm in training my men to follow each safety rule. If I should come upon a group and observe a safety rule being broken, I should stop the crew then and there and insist upon the observance of the rule. It is not necessary to tear the shirt off the offender's back, but rather in a brotherly way to explain the rule that had been disobeyed, and then point out all of the things which could happen as a result. If I should see a rule disobeyed and fail to mention it, the men in the gang, through my silence, may get the idea that I approve of the faulty practice. If I let that opportunity slip by today, I have left the gate wide open for personal injuries tomorrow. If after drilling my men carefully in safety, I decide to be a good fellow with them by pulling my punches on the safety rules, I have lost the beachhead for which I have striven so earnestly.

A few years ago, in company with a track supervisor, I came upon a group of men composed of several section crews, who were in the act of changing out the low rail of a curve. The work had been completed up to the point of making the closure. The gap had been measured and the rail marked. The foreman on whose section the work was being done had squatted down and was holding a chisel on the mark. The man who was to use the sledge hammer stood with the tool over his shoulder, ready to strike the first blow, when it was noticed that neither the foreman nor the man with the sledge hammer had his goggles on, contrary to a rule in force on this road. This fact was quickly brought to the attention of the track supervisor, who immediately spoke to the foreman. "Bill, you want to get your goggles on." Bill turned and looked up at the supervisor, his eyes wide open. The expression on his face told the whole story.

As a supervisory officer, I must be a thorough believer in the safety rules. Safety to me must be a religion, not in the frame of mind that so many go to church from time to time, but to the extent that I live the safety rules every day. I must never permit myself to violate a safety rule at any time. A supervisory officer who violates a safety rule willfully, even for the purpose of speeding up his work, has no right to expect 100 per cent safety performance on the part of the foremen and men under his supervision.

I must be a supervisor who always sets a correct example. If it is my duty to cover my territory on an inspection motor car which, in good working order, may make 35 to 40 miles an hour, I must not operate that car in excess of 25 miles an hour if the Book of Rules calls for me to operate it not in excess of 25 miles an hour. Because I wish to reach a certain road crossing or a certain town within the next 15 minutes is no excuse for me to operate my motor 15 miles an hour faster than allowed in the prescribed rule. If I operate my car at 35 miles an hour when I think no one is in sight, it may be that a section crew around the next curve will hear me coming; and don't think that that section crew, hearing my engine exhaust, can't tell when I am going faster than 25 miles an hour. How can I violate the speed limit when I may have criticized the section foreman the day before for violating the same rule, or may have to criticize him tomorrow.

I must be a living exponent of Safety. I must *set* the example for my men, a point which is emphasized appropriately in the following lines:

I would rather see a sermon than hear one any day,
I would rather one should walk with me than merely point the way.
Fine counsel is confusing, but example is always clear,
For the eye is a better pupil and more willing than the ear.
And the best of all the preachers are the men who live their creeds,
For to see the good in action is what everybody needs.

Now I can soon learn how to do it, if you'll just let me see it done,
I can watch your hands in action, but your tongue too fast may run.
And the lectures you deliver may be very fine and true,
But I'd rather get my lesson from observing what you do.
For I might misunderstand you and the fine advice you give,
But there's no misunderstanding how you act and how you live.

Dynamiting Does the Trick in Dismantling Old Bridge*

By G. A. Belden

Engineer Bridges and Buildings, Central of Georgia, Savannah, Ga.

In this article, which deals with a two-span deck truss structure, the author tells at length the manner in which the work was carried out, looking to salvaging as much material as possible. Particularly interesting are the pier blasting operations employed to govern the fall of the superstructure

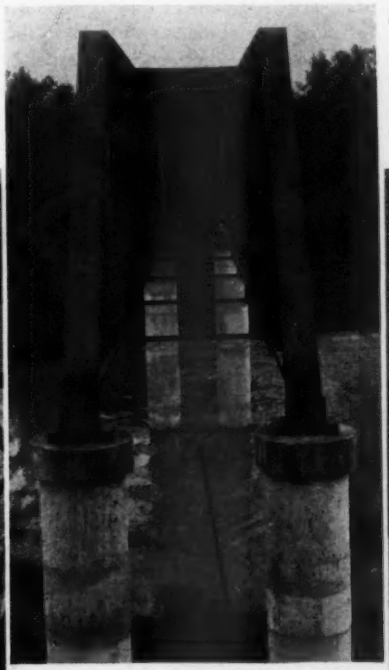
BY careful work in the dismantling of a double-span deck-truss bridge on an abandoned line, involving the judicious use of dynamite, the Central of Georgia was able to salvage a considerable part of the steel for reuse in making repairs to bridges and other facilities. Altogether about 300 tons of steel were recovered from this structure, and that part not reclaimed for further use was made available as scrap for further use.

Spanning a stream known as Potato creek, the bridge in question was located on that part of the Thomaston district of this road between Langley, Ga., and Crest, which was recently abandoned and taken up. Erected in 1927, the bridge consisted of two 150-ft. pin-connected deck-truss spans, which were flanked at the west end by a 70-ft. deck-girder span and a single-panel pile-trestle approach, and at the east end by a five-panel pile-trestle approach. The main spans were supported on piers consisting, in each case, of two concrete cylinders encased in steel plates. At the time the work of dismantling the bridge was undertaken, the track at the west end of the structure had been taken up, but a track connection was still available to the east end.

Since the main spans were not to be reused in their entirety, it was not necessary to remove them intact, and it was decided that the most simple and inexpensive method of dismantling them would be to dynamite the piers. The first step, however, was to remove the approach trestle and the 70-ft. girder at the west end. In this phase of the work, the connections between the girders were severed and were removed separately.

Stripping the Deck

The next step was to strip the deck from the two truss spans, using a 15-ton locomotive crane. This work was



Left—A Derrick Removing the Girders at the West End of the Bridge. Above—The Truss Spans as They Appeared After Stripping. Right—After the Blasting Operation, Showing How One Truss Fell on Top of the Other

* Based on an article in the Central of Georgia Magazine, supplemented by additional details.

begun at the west end and carried progressively eastward, panel by panel. First the rails and ties in each panel were taken up and loaded, after which the stringers and bracing were taken out, leaving only the floor beams and the bottom chord struts in place to hold the trusses together. In the following step, all rivets in the floor-beam connections, top-chord splices and gusset plates were cut out with a pneumatic rivet buster, and replaced with only a sufficient number of bolts to keep the trusses from falling or being blown over while workmen were engaged around and under the bridge.

Use Bolted Connections

In doing this, it was reasoned that the lightly-bolted connections would break loose more easily than riveted connections when the trusses fell, and that, as a consequence, the removal of the members from the stream would be facilitated. Obviously, it was easier and quicker to cut out the rivets while the trusses were still standing than it would have been if this work were done in the water, which was quite deep and cold at the time. As another preliminary step, the nuts were removed from all the pins, with the result that, when the trusses fell, some of the pins dropped out and the remainder were easily driven free from the bridge members.

Since it was the desire that both trusses should fall in the same direction, only the pier cylinders on one side of the bridge were blasted, namely, those on the southerly side. First, however, the steel plates on the cylinders were sprung loose and removed by jacking. Incidentally, in their removal, these plates suffered so little distortion that they were reclaimed without rerolling to form two cylindrical water tanks, 6-ft. in diameter, to be used to replace two wood storage tanks at Thomaston, Ga.

How Blasting Was Done

In preparation for the blasting operation, a 1½-in. hole, 4 ft. deep, was drilled near the base of each of the three southerly cylinders, and three sticks of 60-per cent dynamite were used in each hole. Wires from the firing caps were run to a blasting machine on the east bank of the creek, and all three charges were exploded simultaneously. As planned, the three southerly cylinders broke off close to their bases, causing both trusses in each span to fall toward the south, one on top of the other. As the trusses fell, the northerly cylinder in the pier at the west end of the bridge also broke off at the ground line, but the other two northerly piers remained standing and were later broken off with light shots of dynamite.

An inspection of the trusses after they had fallen showed that all the bolted connections had pulled apart. Hence, to complete the dismantling of the bridge into individual members it was only necessary to drive out those connection pins that had not come out as the trusses fell. In the next operation, a 15-ton locomotive crane, stationed on the trestle approach at the east end of the bridge and using 300 ft. of ⅞-in. wire rope, pulled the individual members out of the creek and loaded them directly into low-side gondola cars standing behind the crane. As each car was loaded, it was switched by the crane to a siding about 1,200 ft. east of the bridge, and an empty car brought back for loading. The final step was to remove the five panels of open-deck trestle at the east end of the bridge, this also being accomplished, and the material loaded, with the aid of the locomotive crane.

The work of dismantling the Potato Creek bridge was performed by the company's iron bridge gang under the direction of H. C. McKee, bridge inspector, and O. P. Ivey, foreman.

Cellophane Overlay Method Cuts Drafting Time

By George R. Burkhardt

Chief Draftsman,
Chicago, Burlington & Quincy,
Chicago

This article describes a new method of altering official maps and plans to show new work, building or lease areas, or other conditions, for reproduction by either the photostat or blueprint method, with minimum drafting and without defacing or otherwise marring original tracings or official drawings

AS an aid in solving the problem of inadequate manpower in its drafting department, which has come about simultaneously with increased demands for plans showing new track and building construction, areas of land to be bought, sold or leased, etc., a new, simple and rapid method for producing plans is being employed by the engineering department of the Chicago, Burlington & Quincy, which is proving highly effective.

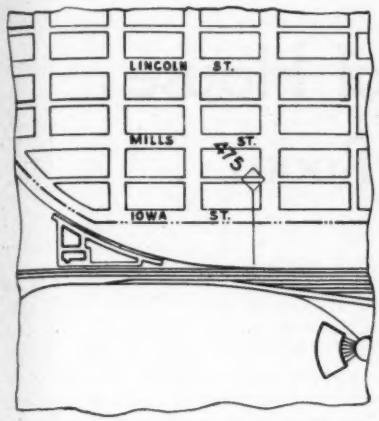
Heretofore, as on most other roads, plans for proposed new construction, alterations or land areas affected, when possible, were drawn on transparent reproductions of the official station or line maps of the specific territory involved. When such reproductions of official maps were not available, which was not infrequent, it was necessary to trace the official maps themselves, whole or in part, in pencil, superimposing on the new copy the proposed new work or conditions. At times, instead of following the procedure indicated, multiple blue prints were made of the official tracings and the draftsmen were required to plat the new work, title, etc., on each of these prints. These various procedures produced the map or plan copies desired, but required at least 50 per cent more labor than is required under the new procedure adopted, and were otherwise more expensive.

To effect speed and economy in the work of its drafting department, the Burlington's Lines East of the Missouri river had already centralized the production of maps and plans in the chief engineer's office at Chicago. This centralization permitted the use of high-speed blueprinting and photostating machines, as well as the use of the official maps, plans and records filed at this point. However, even this proved inadequate under the circumstances being encountered. Something more was required.

Cellophane Overlay Method

The procedure involved in the new method is extremely simple, rapid and economical. In it, there is no duplication of drafting work, because only the new work is drawn, and then only once—there is no copying or tracing of information already shown on the official maps. As a result, the new maps are produced with minimum effort and possibility of error.

The new process involves, first, the use of an opaque paper frame bearing a thin sheet of cellophane of the appropriate size. This is Scotch-

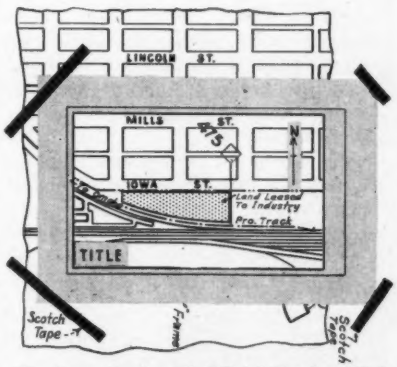


Section of Official Tracing Before and After "New Work" Prints Were Made From It

taped to the official tracing of the territory involved, or to a white print of this tracing, which is very satisfactory for this purpose if photostat equipment is used for reproduction purposes, and especially since this latter procedure saves wear of the original tracing. The paper frame confines the new plats to the area desired, supplies them with border and trim lines, and also masks out the underlying map area between these lines. When the cellophane is in place, the new work is laid out on it with a ruling pen, employing a special fast-drying celluloid ink, which is free-flowing and has the same behavior as standard drawing ink on tracing cloth. The Burlington uses No. 1119 ink (manufactured by the Craftint Manufacturing Company, Cleveland, Ohio.) Most lettering is done with a Gillott's No. 170 pen point.

If photostat reproduction equipment is available and is to be used, the title for any new plan or map is typed on a separate piece of opaque paper and is fastened to the cellophane in the area desired by means of rubber cement. A north point, previously drawn on opaque paper, is also cemented to the cellophane where desired. If photostat equipment is not available and maps are to be reproduced by the contact process, the title may be typed on the cellophane between carbon sheets, with the carbon faces of the two sheets contacting the cellophane, so that carbon is deposited on both sides of the cellophane. Likewise, previously prepared north points, on cellophane, can be superimposed on the cellophane overlay. If the photostat method of reproduction is to be used, changes in existing lines on the base tracing or print, to indicate facilities shifted or removed, can be shown by covering these lines on the cellophane overlay with solid or broken lines in china white.

If the new work to be shown consists of areas of land to be leased, bought or sold, the usual coloring of prints can be avoided by symbolizing these areas with benday material—a transparent material in sheet form bearing any one of many arrangements of dots—which can be cut to size and pasted over the areas involved. A finished map of this type is shown in Fig. 1, which also shows separately the paper frame and cellophane overlay, with the small amount of pen work on it. If the base map being worked from is a blueprint, instead of a tracing or white print, all of the new work is shown on the cellophane overlay in chinese white, instead of in black



The Same Section of Official Tracing With the Cellophane Overlay Over It, On Which the Proposed Work Was Inked

ink. Obviously, new buildings and new tracks can be shown equally as well as the outlines of land areas. Where a profile is required integral with the map, when new tracks are to be constructed, a strip of standard profile cloth or paper is interposed between the base map and the cellophane, and the profile is platted on the cellophane.

Use Carrying Container

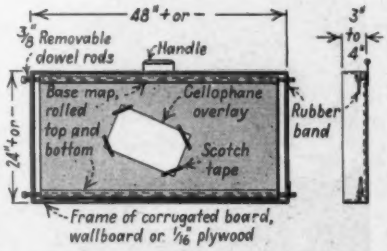
To carry the finished map to the blueprint or photostat room, it is placed in a container, as shown in Fig. 2. This container, which can be made of corrugated board, wallboard or 1/16-in. plywood, should be approximately 48 in. long by 24 in. wide, sufficient to hold the longest tracing or print rolls, and preferably 3 to 4 in. deep. It has no face cover.

To hold a base map, with its cellophane overlay, in place, the container is fitted top and bottom with ⅜-in. removable wood dowel rods, which support the opposite rolled ends of the map either way from the overlay area. Free-hung rubber bands at each corner of the frame, slipped over the ends of the dowels, prevent their turning or sliding out of place after a map has been supported on them. If desired, two or three dowels can be provided top and bottom to permit carrying either two or three maps at the same time. The container is recommended since it prevents unnecessary soiling of or other damage to the original maps.

In the reproduction room, a negative is made for permanent record purposes, and then the negative, in either the photostat or blueprint method, is used to produce as many blue-line prints as are required. After the negative is made, the opaque frame bearing the cellophane is removed from the official map and, to permit the re-use of the cellophane, the inkwork on it is removed by wiping it off with ammonia and a soft cloth.

The method of plan reproduction described, which is known as the "Cellophane Overlay Method," was invented by the writer. The method has not been covered by patents, although it is patentable. The present cost of one sheet of non-shrinkable cellophane 8¼ in. by 15 in. is slightly less than one cent. One hundred feet of non-shrinkable cellophane 20 in. wide costs $2.75. A two-ounce bottle of the special ink required can be purchased at a cost of 35 cents.

In addition to its use in map change and reproduction work, it is obvious that the Cellophane Overlay



The Carrying Container to Preclude Damage to Plats and Tracings in Handling Them to and From the Blue print Room

Method is equally well adapted to other kinds of drafting, with the outstanding advantage that it permits alteration of the original for reproduction purposes without marring or defacing it in any way. Furthermore, the method can be applied to drawings or maps of any size, and the reproductions produced have the same sharpness as if they were made from new tracings. The method has been in use on the Burlington for more than a year and a half, and has been particularly effective in the production of maps to accompany contracts, leases and forms requesting authority for new work.

Builds Yard Section Tool House with Lunch and Office Room

A tool house constructed by the Chicago & North Western for a yard section at Clinton, Iowa, has a special room where the gang can congregate to eat lunch or get in out of the cold or rain. This room is also equipped with an office desk and files which are used by the foreman in making out reports

THE Chicago & North Western recently constructed a tool house of a new design for its 5th Street yard section at Clinton, Iowa. This tool house, in addition to providing space for housing a motor car, tools and other working equipment, has an adjoining room with a stove, table and settees in which the men can gather to eat lunch, or to get out of the rain in summer or to get warm in cold weather. This room is also equipped with an office desk and files for the section foreman. Previously, this gang had a tool house of standard size which was too small for the large yard gang, and a portion of an old carbody had been used for tool storage. This carbody was in a dilapidated condition and when the railroad decided to remove this building, it became necessary either to repair and enlarge the old tool house or to build a new tool house adapted to the needs of this gang. The latter course was decided upon.

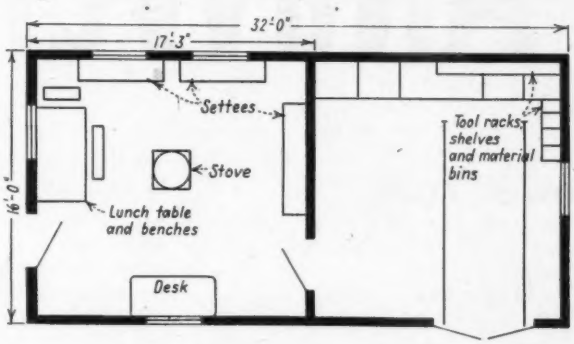
The 5th Street yard section employs 10 to 18 men, depending upon the season of the year, to maintain approximately 23.7 miles of tracks and 175 switches. It's territory includes 2½ miles of double-track main line, extending approximately 1 mile east and 1½ miles west of the section headquarters, and also 3 miles on a branch line running north from Clinton, on which numerous industries are located. More than 75 per cent of the work of this gang is less than a mile from the tool house, so that it can be reached conveniently at noon and during periods of inclement weather. Much work is also required of this gang at night and the new tool house also serves as a place to gather out of the weather when called at night and to eat lunch during long and cold night shifts.

Construction Features

The new tool house occupies the same location as the old, about one-half mile west of the station on the north side of the yard. It is a frame building, 16 ft. by 32 ft., with a motor car and tool room 14 ft. 9 in. by 16 ft. on the east end and an office-lunch room 17 ft. 3 in. by 16 ft. on the west end. It has a monolithic concrete foundation and floor, on a compacted cinder fill. The foundation walls are 12 in. wide and extend from 12 in. below the ground level to 6 in. above. The floor is 6 in. thick. The wall and partition framing is of 2-in. by 4-in. lumber, bolted to the concrete

Left—A Portion of the Office-Lunch Room as Seen from the Doorway to the Tool House Room. Below—Two Views of the Exterior of the New House

with ½-in. by 6-in. anchor bolts spaced on 6-ft. centers, which were embedded in the concrete for that purpose. The exterior is faced with 1-in. by 6-in. drop siding and painted a carbody red. The roof has 2-in. by 4-in. joists and rafters with a 1 in 3 pitch and 1-in. D & M sheathing, covered by slate surface roll roofing. A six-inch cast-iron smoke jack serves as a chimney for a stove in the office-lunch room.



Plan of the Yard Section Tool House with Office - Lunch Room

The structure has five windows and three doors, two exterior and one interior. One door at the west end near the south end of the west wall provides entrance to the office-lunch room. The other exterior door is a double door for the motor car, near the east end of the south wall. An interior doorway is provided between the two rooms, located near the south end of the partition. Four windows are located in the office room, two in the north wall, one in the west wall, and one in the center of the south wall of this room, overlooking the yard. One window at the east end provides light in the motor car and tool room. The windows and doorways have 1-in. by 4-in. trim, both inside and outside.

Office-Lunch Room

The desk for the foreman in the office-lunch room is located in front of the south window. File cabinets are set on the desk on each side of the window. The remainder of the furnishings consist of a station stove, located in the center of the room; a lunch table with two benches at the west end in front of the window in that wall, and three old station settees with the intermediate arms removed, two along the north wall and one along the partition or east wall of the room. Both this room and the motor car room are provided with electric lights.

The walls and ceiling of the office-lunch room are finished with beaded ceiling and the ceiling is insulated with ½-in. fiber board. The walls and ceiling of this room are painted ivory and the trim blue. The four windows and interior painting provide a well-lighted, cheerful atmosphere.

Tool House Room

The tool house room has scrap 60-lb. rails embedded in the concrete floor for a motor car runway. The double door for the motor car is 6 ft. wide and 6½ ft. high. The partition and the north wall are finished with 1-in. by 4-in. shiplap, unpainted and the other walls are unfinished and unpainted on the interior. This room has no ceiling and has built-in racks, bins and shelves for tools, lamps, bolts, etc. A flat tin tray on the floor is located where it will catch oil and gasoline drip from the motor car motor and prevent staining the concrete. In the southeast corner is a special plug for use with a heavy-duty 100-ft. extension cord and light for repair work at night near the tool house.

The tool house was completed on December 7, 1943, and has proved very satisfactory since that time. The foremen and men are highly appreciative and proud of it and keep it looking neat.

This building was constructed by local railroad forces under the direction of B. R. Kulp, chief engineer, and L. C. Winkelhaus, engineer-architect, of the North Western.

N. & W. Adopts Giant Tie Plate

(Continued from page 708)

ting heads to produce cuts of the necessary width outside the limits of the existing seats to accommodate the 18-in. plates. The machine is self-propelled, is operated by one man, and is provided with adjustments and controls that permit cuts of the desired depth to be made with a high degree of accuracy required in such work.

The work of inserting the 18-in. tie plates as an independent out-of-face operation is performed by an extra gang of 20 men. This is a relatively simple procedure, carried out first on one rail of a curve and then the other, in which the major steps include the pulling of the spikes, the removal of the existing tie plates, the adzing of the ties as necessary with the machine described above, the plugging of the spike holes, and the placing and spiking of the 18-in. tie plates. When removing the old tie plates and, later, when inserting the new plates, the rail is lifted as necessary with the aid of track jacks. As a protective measure, the newly-adzed surfaces are painted with creosote.

Based on experience to date with the 18-in. tie plate, the N. & W. is convinced that the advantages being realized through its use largely as a result of the increased service life that is obtained from crossties are more than sufficient to justify its higher initial cost. This tie plate was designed under the general direction of W. P. Wiltsee, chief engineer of the N. & W., and under the immediate direction of W. H. Bettis, then maintenance engineer and now assistant engineer, and B. E. Crumpler, now maintenance engineer. The work of installing the large tie plates in the field is under the general direction of J. R. Derrick, manager of roadway maintenance.

Old Bridge on the N. Y. S. & W. (Erie), With Wrought Iron Track Rail Compression Members. Rails Bear Marks "BLAEN A V O N" 1871, and "ARM-CO" 56.

posited, to prevent seepage of the cement into the ground. Obviously, the platform should be reinforced with a mesh, which should be carried down into the curbs. In the past, there has been some objection to concrete platforms, because of the destructive effect of brine drippings from refrigerator cars, or of the salt that is used to melt snow and ice during the winter. I am informed that a special air-entraining cement is now being made by all of the cement companies, which overcomes this objection.

Who Should Handle Jacks?

Should inexperienced men in bridge or building gangs be allowed to operate jacks? Why? What special precautions should be taken?

The Answer Is No

By H. Austill
Chief Engineer, Terminal Railroad Association, St. Louis, Mo.

If the term "inexperienced" means men who are totally unfamiliar with the construction and operation of jacks, the answer is no. A jack in good repair is a dependable tool, but in the hands of a novice it becomes a hazard to himself and others. In normal times, bridge and building men serve as helpers or apprentices for a sufficient time to become acquainted with these tools through a sort of a process of absorption. Under present conditions I believe that new men in bridge and building gangs should be given training comparable to that given a rookie in the army, who is shown the construction of a rifle and how to aim and fire it before he is permitted on the firing range. The time spent in giving such instruction will not only promote safety, but in most cases will stimulate interest and produce more cordial relations between the foreman and the man.

Can Be a Hazard

By General Bridge Inspector

An inexperienced man, no matter what department he is working in or the class of work he is engaged in, should not be allowed to operate a jack, except under competent and immediate supervision. If he does not hurt himself or some of his fellow workmen, he may damage the jack and thus create a hazard the next time it is used. Or the danger may be of a different character. I once saw an inexperienced trackman set a large jack inside the rail on a curve, and it was only because another trackman, at the imminent risk of his life, got it out of the track that a serious accident to a passenger train was averted.

One of the common hazards created by jacks when in the hands of those who are not experienced in their use, is failure to center the load on the jack. At its best, this error may cause only damage to the jack; at its worst, it may result in severe personal injuries. Another common mistake made by inexperienced men is failure to provide adequate or correctly-applied blocking. Normally, this error cannot be corrected after the load is applied, and it often requires both experience and seasoned judgment born of experience to know when blocking is adequate and applied correctly. Again, overloading may occur if the man or men operating the jack lack experience and, as before, a hazard is created to all of the men who are depending on the stability of the jack.

Many bridge and building gangs today have larger complements of inexperienced men than ever before. Often, in making disposition of the men, it does not seem feasible to put only experienced men at the jacks, because they are needed to perform other essential and what might become hazardous tasks if left to inexperienced men. In this dilemma, it devolves upon the foreman to instruct his new men in the principles, and as many as possible of the details, of handling jacks, and to give them the maximum possible supervision while the job is under way. Needless to say, the instruction should be given well in advance of the beginning of the job on which the jacks are to be used.

Spot or Out-of-Face Surfacing?

Does the shortage of labor make it desirable to do less out-of-face surfacing and more spot surfacing on heavy-traffic lines? On light-traffic lines? What will be the effect?

Track Will Get Rougher

By W. H. Sparks
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

Because of the acute shortage of labor, the number of extra gangs we have been able to organize is smaller than in normal years, so that the amount of general surfacing we are able to do is decreased in still greater ratio than the reduction in the extra forces, because of the lower efficiency of the men now composing the gangs. Obviously, this situation makes it necessary to depend in larger measure than usual on the section forces, also none too numerous, to maintain line and surface.

After the track has been given an out-of-face surfacing and the ties have been renewed liberally, the section forces can maintain it in good-riding and safe condition for two to four years, depending on the volume and speed of traffic. After this, however, the riding quality deteriorates rapidly until the track is given another general raise. Evidence that this is so will be seen in the surface, the line and the gage, as well as in the general conditions of the track and roadbed, and in the damage that is occurring to the rail, the ties and the ballast.

Under the conditions that are confronting us, there is more spot surfacing and less out-of-face raising of the track than there should be. As a result, the track must be gone over oftener than would be required normally. Even with the best mechanical aids, the work that is being done does not stand up as well as it should, because labor is less effective than formerly, partly through lack of experience and partly because it is not quite up to the physical standards of a few years ago, since most of our young men have left the railroads to enter military or other war service for the duration.

All of these conditions are combining to place a larger burden of responsibility on the shoulders of foreman and supervisors, not only with respect to the track, but to every phase of maintenance. We might as well recognize that we are not able to carry out our program of work as fully or in the same manner as we have been accustomed to do. We should, however, be alert to attack the worst con-

ditions first and see that they are corrected to the best of our ability. The manner in which the work should be done is something that the supervisor and his foremen must work out in the light of the conditions that confront them. In some cases, it will mean doubling up section gangs temporarily; in others, it may be necessary to rearrange the work of one or more of the extra gangs that it has been possible to employ; while, in still others, it will mean longer hours for the forces that are available locally.

What will be the effect? We cannot expect to be able to maintain our tracks to the same high standard on spot surfacing alone that is possible where they can be surfaced out of face when this treatment is needed. Tracks that run beyond the period when spot surfacing is effective, become dead and the riding qualities deteriorate rapidly. In general, dead track, center-bound track and foul ballast, as well as rough track that cannot be made much better without a general surfacing, are obviously the inevitable results of too-long-continued spot surfacing.

Efficiency Is Low

By District Engineer

Extra-gang labor is so scarce that we are being handicapped severely in our efforts to do the amount of out-of-face surfacing that we need to do. In fact, we are having a hard time to get rail laid and surfaced on some of our districts. We are doing as much ballasting and general surfacing without ballast as we can, but this is less than our budget calls for, because we cannot get the men to do all of the work we had planned and which we consider to be necessary to prevent the accumulation of deferred maintenance. In other words, deferred maintenance is creeping up on us again, and there is little that we can do about it. In some places where we have been able to organize extra gangs, the turnover is so high that their efficiency is below the lower-than-normal efficiency of our other forces.

Today, both the volume of traffic and the speed of trains are higher than ever before, in the face of which we are confronted with the necessity for keeping our tracks safe and in conditions for the passage of trains at any speed, with a smaller force at many points than we had during the depth of the depression. Under these conditions it is becoming necessary to do less out-of-face surfacing than the situation calls for and more spot surfacing, regardless of the desirability of this action.

Spot surfacing is a necessary part of the work of the track maintenance forces, which cannot be eliminated. Out-of-face surfacing is equally essential, but the two should be done in close co-ordination, with due regard for several factors, including the volume of traffic, the speed of trains and the character of the ballast. When track is surfaced out of face, tie renewals should be made somewhat liberally and it should then be in condition to run with only spot surfacing from two to four years, depending on the various factors that have been mentioned in this article.

There comes a time, however, when spot surfacing will no longer keep the track in good-riding condition. It first rides "dead," then becomes center bound, after which it is difficult to keep it in good line and surface, and the gage, the rail and the ties all begin to suffer. When track reaches the dead stage, it is ready to be surfaced out of face and start the cycle all over again. Dead, and later center-bound track, will be the result of unbalancing the relation between spot surfacing and out-of-face surfacing, by doing too much of the former and not enough of the latter. This was demonstrated during the depression when many thousands of miles of track became center-bound and rode roughly under slower speeds and a much smaller volume of traffic than prevail today.

The same rules apply to branch lines as to main lines. If the volume of traffic is sufficient to warrant out-of-face surfacing, this should be done at suitable intervals which, probably, will be longer than for main lines. On lines of very light traffic, it is unlikely that out-of-face surfacing will be required, except as locomotive cinders may be unloaded for this purpose from time to time in quantities that can be handled by the regular forces.

Protecting Against Scour

What can be done to protect or secure existing pile-trestle bents from scour in cases where the piles were driven through shallow penetration to refusal on rock or shale?

Riprap Quickest Solution

By J. L. Varker

Supervisor Bridges and Buildings, Delaware & Hudson, Carbondale, Pa.

Usually, the placement of riprap offers the quickest, cheapest and easiest way for protecting piles that have shallow penetration. The effectiveness of this method depends in large measure, however, on the size of the stones and the care exercised in placing them. Again, local conditions of the stream must be considered. These include the depth of the water and the swiftness of the current during both normal stages and freshets. The width of the channel upstream and downstream from the structure should also be taken into consideration, as well as the profile of the stream bed. The stream that widens out near the trestle is most likely to show also a change in the profile of its bed for where the stream widens out the grade usually flattens and bars are likely to form. If these occur at the trestle, the protection of the pile bents becomes less difficult than where the channel is narrower and the current swifter.

Where the channel is comparatively wide and the current is not too swift, it may be necessary to place the riprap on the downstream side only. This will form a barricade which will allow silting to take place and thus fill in around the pile bents. If it is considered that this will not be sufficient, it may become desirable to place riprap around all of the piles and between the bents. Large stones should be chosen because there is less likelihood that they will be disturbed. They should be placed carefully, to afford as much protection as possible. The larger spaces between the stones should be filled with smaller pieces to prevent scouring or the starting of scouring. To do this it may be necessary to remove some of the tower bracing temporarily to allow stones to be swung under the trestle by a crane. However, the removal of any sway bracing is rarely required.

Several Ways to Do It

By A. W. Chapman

Bridge Engineer, Chicago, Milwaukee, St. Paul & Pacific, Chicago

Several methods are available to afford protection under the conditions mentioned in the question. Among them, one can apply sash braces on each side of the bent at the ground line and place riprap around the piles;

or timber cribs can be placed around the bents and filled with stone. Another method is to execute under one pile at a time, place concrete footings on firm foundation and support the bents on concrete which is anchored with dowels. Reinforcement should be used to tie the footing sections together.

When driving piles, it may be desirable to use cast-iron pile shoes to obtain better penetration of the stratum upon which the piles are supported. It is also desirable to drive an additional pile on the upstream end of the bent wherever possible. Another scheme is to prebore holes in the hard stratum so that when the piles are driven they will enter these holes. It is quite difficult to drive piles under the conditions specified, and it will be much better to erect frame bents on concrete footings, or to use girder spans, supporting them on concrete abutments or piers which are carried to a suitable depth.

Eliminating Personal Injuries

To what items should a foreman give particular attention, in order to eliminate personal injuries to the men in his gang?

A Vital Problem

By G. P. Palmer
Engineer Maintenance and Construction, Baltimore & Ohio Chicago Terminal, Chicago

This is a vital problem, particularly at present, since we are forced to use a large number of "green" men who have had little, if any, experience in railway maintenance. The problem is, obviously, associated directly with what we usually term safety first. A foreman must give particular attention to both education and supervision, and must be sure that all of the tools and equipment used by his gang are in good condition and that his men know exactly how to use them.

With respect to supervision, a foreman should be with his gang at all times, not only to watch over them but to show them how to do their work correctly and safely. If he must be absent for any reason, he should turn this duty over to some reliable man in his gang while he is away.

One of the serious phases of the problem is to ascertain how to combat carelessness. This can be done only by education and by continuous efforts by the foreman to see that the men always have their minds on their work and on the conditions surrounding it. In this connection, it is desirable that team work be developed so that where men must work together, each of them will look out for the others, as well as for himself. The foreman should avoid excitement and confusion, since they often lead to injuries.

Today, most roads have safety rules and regulations mainly for the benefit of the men themselves. Foremen should have copies of these rules and call attention daily to one or more of them for the benefit of the men. In this way, the subject of safety is kept constantly before them. Finally, if, unfortunately, some accident or injury occurs, that should be used as an example, to prevent any similar accident from happening in the future.

Take Nothing for Granted

By G. S. Crites
Division Engineer, Baltimore & Ohio, Baltimore, Md.

Undivided attention to duty is the basic need for preventing accidents of all kinds and especially for the prevention of personal injuries. It also makes the day go faster and better and will wind up the day with the feeling that it has been spent safely and wisely. Undivided attention to duty means that the foreman takes nothing for granted at the start of the day's work. Interest in the men is shown by looking them over; by finding out how they are; whether they are clothed and shod suitably; and whether they are otherwise in condition to give attention to their tasks of the day. This latter information can be obtained by outlining in detail the work to be done, and in being certain that the men know what is expected of them.

In this outline of tasks, the correct number and the condition of tools should be gone into; checking the flagging equipment with the man who is to use it, and how it is to be used, when necessary; and finally, the assignment of the men to their tasks, with the tools which they are to use. I have seen an alert foreman start as many as 70 men out and have them doing their work on an organized basis within five minutes of the time they had unloaded themselves and their tools from the cars. While this was an experienced and well-organized gang, it was well organized because the foreman had given his undivided attention to making it so and to his work.

Our printed rules are replete with instructions to do and not to do certain things for the purpose of avoiding personal injuries. They have been written in the blood of injured men. The foreman must become so familiar with them that they become almost instinctive with him, and he will then, as instinctively, know the safe course to take when a situation confronts him that is not definitely covered by any particular rule.

Must Set Example

By C. Halverson
Division Roadmaster, Great Northern, Grand Forks, N. D.

Injuries most commonly sustained by maintenance of way employees are to the eyes and those that occur when handling ties and in motor-car operation. To avoid any class of injury, however, the foreman should set an example for his men. If he is lax or permits deviations from the rules, it follows almost automatically that the men will take chances. He should explain the meaning of the rules to his men, then follow up to see that they obey them. He should teach the men the safe way to perform their work, then insist that it be done in a safe manner.

All of this requires a certain amount of organizing ability, and a good example of what can be done is the foreman who always keeps his tool house in a neat, orderly condition, and who keeps his motor car clean and in running order and the tools stowed correctly on the car. He will assign certain of his men to keep lookout front and rear for trains and for vehicles moving over grade crossings. He will encourage his men to provide themselves with proper wearing apparel, including safety shoes, which have saved many toe injuries, and goggles for work that may endanger the eyes. The correct method of lifting, and the safe use of tools should be demonstrated clearly.

Care must be exercised in handling ties, and men should be encouraged to wear heavy leather gloves to protect their hands against creosote. Foremen should assign men to tie cars who are capable of unloading ties without injuring themselves or others. Tie tongs should be kept in good condition, with the prongs filed sharp to insure against slipping. When pulling ties with tongs, even pressure should be exerted to lessen the probability of

the tongs slipping. Men should also be taught to stand in correct position when pulling ties into place, so that they will not lose their balance if the tongs do slip.

All rails to be lifted should be marked at the center to insure that they will not be out of balance, and thus out of control, when lifted, as there is real hazard of personal injury. The men should be taught to stand away from rails when guiding them into place, to prevent injuries to feet when the rail is lowered. The rail should also be gripped correctly to prevent injuries to hands.

All of the men should be taught to be alert to detect approaching trains and motor cars and, when operating or riding motor cars, vehicular traffic moving across grade crossings. Motor cars should not be permitted to move over grade crossings unless the way is known to be clear. A good headlight should be provided on motor cars that must be operated at night, particularly during storms. Line-ups must be obtained from the train dispatcher to cover main-line movements not otherwise protected, and these line-ups should be discussed with the members of the gang, so that every one of them will be familiar with the information they contain.

Flag protection should always be provided for motor cars where the view is obscured and when there is any doubt about the safety of the movement that is to be made. It is a good idea for the supervisor or roadmaster where possible, to get into contact with foremen by telephone, who are going out to patrol the track during inclement weather or in other emergencies, so that both will have a clear understanding of where they are to go and of the purpose of the trip.

Foremen should not neglect to talk to the men about safety every day for men forget easily, and their minds must be refreshed frequently to obtain best results. They should have confidence in their men ,and take an interest in them and assist them with their problems. By doing so, they will create a spirit of co-operation that will be reflected in a considerably lowered personal injury rate.

Can Be Only One Answer

By W. E. Folks

Track Supervisor, Cleveland, Cincinnati, Chicago & St. Louis, Cincinnati, Ohio

From observation and experience, and constant association with foremen engaged in many kinds of work, I am convinced that there can be only one answer to the problems that confront maintenance men in their daily work. In other words, there is a right way and a wrong way for the performance of every task, and the foreman should be familiar with all of them. Every change from one class of work to another brings a new batch of hazards, unless the work is done the right way, and this means that the foreman must not only be familiar with the work that is to be performed, but that he must be alert to look out for the men in the gang and to see that they perform the work safely. This cannot be accomplished by haphazard supervision; the gang must be put on an organized basis and worked as a team, with every move in harmony with others that must be made.

Some foremen seem to think that small details need small supervision, taking the position that the members of the gang should be familiar with them and, therefore, need no attention. This is a wrong attitude, for the records show that the majority of personal injuries arise from the simplest details of the work, such as tie tongs slipping because they have not grasped the tie; improper handling of the claw bar; misuse of picks; incorrect setting of spikes; failure to stand at a safe distance when a track chisel is in use; and other routine tasks that are so often done carelessly or with lack of adequate attention to detail. Anyone who is interested will find that the foreman who goes year in and year out without an injury in his gang, and there are many who do, is one who gives attention to the small details. He is the type of leader who feels and is willing to assume responsibility, not only for the conduct of the work, but for the safety of the men in his charge.

Should They Be Separated?

To what extent is it practicable to lay water and sewer lines in the same trench? What are the advantages? The disadvantages?

It Is Objectionable

By E. M. Grime

Engineer of Water Service, Northern Pacific, St. Paul, Minn.

As a general rule, it is neither convenient nor advisable to lay water and sewer lines in the same trench. The sewer must always be laid to a definite grade, whereas the water line, within certain limitations, can usually be laid to a less depth and may be allowed to follow the contour of the ground more or less closely. Again, sanitary conditions usually prohibit the placing of a drinking-water supply pipe in the same trench with the sewer, because there is always a possibility of the ground being contaminated by leakage from the sewer. While the water main usually is under pressure, there is the possibility that in case of leakage in the water main a reversal of pressure may occur at some time and permit sewage to be drawn into the water main. Some sanitary men object to a water main crossing a sewer unless the water line is placed above and at a distance of several feet from the sewer.

This problem does not rise frequently in railway work because, as a rule, sewers are short and, if they do not connect directly with a public sewer, they empty into a depression on company property where ample drainage is available. There are exceptions, however, and the case has arisen where both drainage and water supply have had to be carried over rolling country to a somewhat distant terminal. In this case, a ditch that was necessarily quite deep in places, to obtain the correct and uniform grade for the sewer was also made to serve as the location for the water main. The main was laid on a bench excavated along one side of the ditch, but followed the contour of the ground, and the pipe was always kept at least three feet to one side of the sewer. The sewer ditch was then backfilled up to the level of the water main before the latter was tested for leakage.

Usually, the only advantage in laying a sewer and a water line in the same trench is the saving that may be accomplished by reason of less excavation, curbing and backfilling for a width of trench that will accommodate both lines, compared with two narrower trenches for separate lines. The chief disadvantages are that leakage in the water main can be quite extensive and yet not be discovered readily because the water may find its way into the sewer and be carried away, instead of showing up at the surface of the ground. Again the point

of leakage may be difficult to discover. Sanitary considerations also make this form of construction undesirable.

May Cause Contamination

By C. R. Knowles
Superintendent Water Service (Retired), Illinois Central, Chicago.

At first glance it might appear to be entirely practicable to lay water and sewer lines in the same trench. However, few, if any, municipal water engineers approve of the practice. The principal objection emanates from the health authorities, because there is always the possibility of pollution of the water, in the event that the water is shut off or there is a break in the water line. The United Public Health Service, as well as some state departments of health, does not permit the practice because of this danger of contaminating the water.

Some municipal rules and regulations also prohibit the placing of more than one pipe line in the same trench. The regulations of the water department in one city specify that "no service pipes shall be laid in the same trench with gas pipes, sewer pipes or any other facility of a public service company, or within three feet of any open excavation or vault." This, or similar rules, represents the general practice of municipalities, especially those in the eastern states.

When leaks occur in underground water lines, the water usually rises to the surface of the ground, making detection relatively easy. If the water line is laid in the same trench with a sewer line, the leakage may find its way into the sewer, with the result that the leak will not be detected.

The only advantage in laying more than one pipe in the same trench is the saving in excavation and, in some rare cases, where there is insufficient room for more than one trench. The initial saving through less excavation and backfill will, in most instances, be more than offset by the increased maintenance expense which, it must be remembered, is a continuing charge. As a rule, sewer lines are laid to a lower grade than water mains, with the result that the water main may settle because of the loose soil between it and the sewer pipe. Again, it is difficult to support a water main that has been undermined, when excavating to make repairs to the sewer. Attempts have been made to overcome this objection, in part at least, by placing the water main on a shelf in the trench to overcome the danger of this settlement, as well as to facilitate the repairs to the sewer. Aside from any other objections to the suggested practice, the expense involved in the construction of a trench capable of holding both lines is probably equal to the cost of two trenches in most cases, but even if it is not, the advantages of placing each pipe line in a separate trench outweigh any advantages that the combination trench may possess.

When Ballast Fouls

When stone ballast shows a chronic tendency to foul, is there any advantage in applying a blanket of sub-ballast? Why? To what depth? If not, how can the condition be remedied?

Only One Cure

By T. A. Blair
Assistant Chief Engineer System, Atchison, Topeka & Santa Fe, Chicago

It is my experience that the only cure for fouled ballast is to clean the shoulder ballast and, where the cribs are fouled, to clean them also. My conception of stone ballast which shows a chronic tendency to foul, is ballast in which, through disintegration of the stone itself or through material that has blown in, the ballast becomes so foul that the ties churn and form mud pans around them. These mud pans serve as pumps, in which the ties act as pistons to pump additional amounts of disintegrated stone and blown-in material from the ballast section. In rare instances they may even pump material from the subgrade.

The best procedure is to clean the stone ballast and resurface the track on stone ballast that resists disintegration. It will then be necessary to reclean the shoulder at intervals of such frequency that the drainage can be kept open at the ends of the ties and thus prevent the formation of mud pans or "stockings" around the ties.

I am convinced that when ballasting a new track, a sub-ballast consisting of a stabilized mixture, such as a compacted mixture of gravel, sand and soil in suitable proportions, will result in future economy in maintenance. I am also convinced that the economical solution of the problem of chronic churning spots in track that is now ballasted, is to maintain drainage through the ballast shoulder.

Must Keep Clean

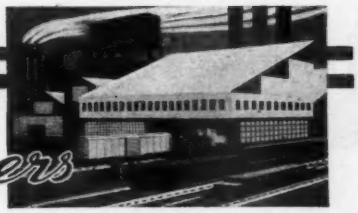
By W. H. Sparks
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

On almost every road today, much ballast has been ruined because it was not given attention at the right time. Any kind of ballast will become dead and will then foul if it is not stirred up in some manner. Cleaning it with ballast cleaners, of which several designs are available, will provide the best and most dependable relief, and there is no better way to save maintenance money than to keep ballast clean. It must be emphasized, however, that the cleaning must be done at the time it is needed, for if it is not, conditions will grow worse rapidly and the cost to restore the track and roadbed to first-class condition will be increased. There has never been a time when ballast has fouled so quickly as it is doing today, for which reason ballast cleaning is needed more widely than ever before. If the ballast is not cleaned adequately, and kept clean, the general condition of the track will deteriorate, surface and line cannot be maintained and the rail will wear faster.

Is there any advantage in applying a blanket of sub-ballast? Clean ballast, regardless of the type of material, should **never** be unloaded on top of dirty ballast. If it is, the new ballast will soon foul and eventually will be no better than the dirty ballast that it covers. Even if the track is raised on the foul ballast, the result will be the same, although it may be somewhat longer before the results are apparent. At any place where dirty ballast remains above the bottom of the ties, the new ballast will become foul, for the old ballast will block the drainage and start the cycle all over again. This has been one of the errors of maintenance men, including both foremen and supervisors.

Only by taking the time necessary to eliminate and to correct the condition by cleaning the ballast, and then surfacing the track on new material, can the situation be remedied. The sooner the railways, meaning both engineering and executive officers, awaken to the fact that the cleaning of ballast is as necessary as other essential maintenance operations, and provide equipment to do the work on a scale commensurate with the needs, the sooner they will have cleaner and better-riding track. Foul ballast shortens tie life, accelerates rail wear and requires much unproductive labor.

PRODUCTS of Manufacturers



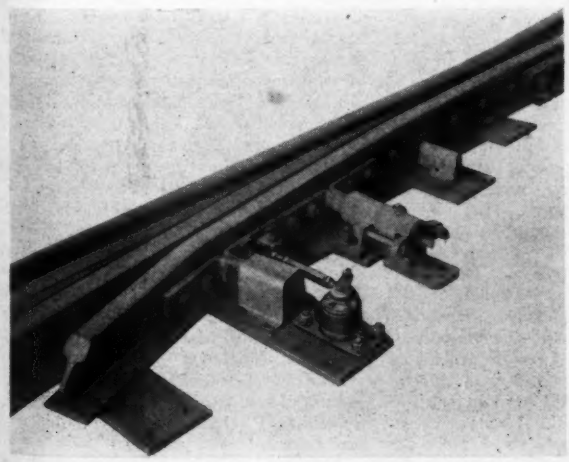
Houdaille-Hershey Spring Frog Control

THE Houde Engineering Division of Houdaille-Hershey Corporation, New York, has developed a special hydraulic shock absorber or retarder and connecting link for controlling the movement of the spring rail of spring frogs. The use of this device eliminates the snapping action which is detrimental because of impact loads imposed on the component parts of the frog assembly and also on car wheel flanges.

The retarder is mounted on a plate on a tie adjacent to the spring rail and connected by means of a rubber-bushed link to a clip or bracket which is attached to the spring rail. The internal valving of the retarder is such that no resistance is offered to the opening of the spring rail. However, a controlled resistance is immediately set up the instant wheel pressure is released and spring action begins. This control is maintained throughout the entire return movement to a point approximately ½-in. from the closing position, after which instantaneous release is affected by a by-pass in the retarder.

The closing time of the retarder may be varied to conform with unusual conditions by means of a simple, external adjustment pointer located at the top of the retarder. The retarder itself is self-lubricating and the rubber-bushed link assembly requires no lubrication. A hinged steel guard can be supplied to cover the retarder assembly and thus provide protection.

This hydraulic device was developed expressly for spring frog control and is said to be made to accurate specifications.



The Houdaille Spring Frog Control or Retarder in Place on a Spring-Rail Frog

P-M Rerailer

A NEW type of rerailer has been developed by the Pettibone Mulliken Corporation, Chicago, which includes a bridge which fits over the rail and cleats on the bottom, spaced to bear against the side of ties and prevent sliding. A feature of the rerailer is that it may be placed by one man, without spiking or clamping and it is said that after it has once set, it will not tip, upset or slide. This eliminates the need for digging and tedious spiking in cramped quarters, thereby saving time.

The rerailer is made of manganese steel with flares wider than usual and with gradual slopes. It has a handle underneath and a large hand hole on the side to facilitate handling and placing in position. It also has two hanger holes on the side, one round and the other oval, for variable spaced hangers. It is said that the stop on the inside rerailers is low enough for clearance, but high enough to tend to prevent overriding of wheels and that their design will eliminate dangerous side slip.

Because it is made of manganese steel the rerailer resists the shock stresses and heavy impacts common to its use without deforming or breaking and if it deforms under unusual conditions, it can be sledged back into shape and used again.

The rerailer is made in inside and outside designs, and in two sizes: No. 6, for use on all light rail sections up to and including 90 lb.; and No. 7, for use on all rail from 90 lb. up to and including 131 lb. The No. 6 inside and outside rerailers weigh 105 and 115 lb., respectively, and the No. 7 inside and outside rerailers weight 150 and 155 lb., respectively.

A No. 6 Pettibone-Mulliken Inside Rerailer

What Our Readers Think

Paper Salvage

Greenville, Pa.

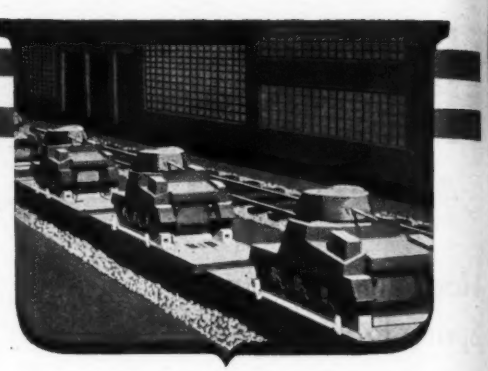
TO THE EDITOR:

You may be interested to know that after reading your Letter to Readers, in the July issue of *Railway Engineering and Maintenance*, on the lengths to which publishers are being forced to go in their conservation of paper to keep within the quotas fixed by the government and particularly the last paragraph in regard to cleaning out all old paper and files that can be released safely, we developed that we had an enormous number of old magazines stored in the basement of our office building, which have been accumulating through the years.

As the result of the suggestion in your letter, it has been decided to dispose of these old magazines immediately, which we estimate will total about 2,000 lb. of paper. We greatly appreciate your suggestion and we want you to know that it has done some good.

F. R. LAYNG,
Chief Engineer, Bessemer & Lake Erie

NEWS of the Month



Personnel Needs 102,000 on June 1

Needs for additional personnel for the railroad industry total 102,000 on June 1, compared with 107,000 on May 1 and 93,000 on June 1, 1943, according to the United States Railroad Retirement Board. The estimate for the entire industry is based upon a tabulation of reports from 185 employers. By mid-May, employment on Class I railroads had risen to 1,425,000, about 12,000 more than in mid-April and 34,000 more than at the top of the 1943 summer peak.

The end of the school year in some localities and the arrival of 5,900 Mexicans during May helped fill some of the railroad jobs. In contrast with the overall decrease, however, shortages in the far west and southwest were somewhat larger than a month earlier. From comparative tabulations of additional needs reported by a group of 40 large employers and a group of 62 relatively small employers it also appeared that needs of the smaller employers increased about 5 per cent and those of the larger employers decreased about 5 per cent.

Decree Strict Priority for War Injured

Under the provisions of a new service order (No. 213) of the Interstate Commerce Commission, railroads have been given the utmost leeway in diverting facilities in order to create strict priority for wounded service men en route from seaports to various hospitals. Under the set-up the railroads are required to (1) cancel or discontinue passenger service; (2) refuse permission to passengers to board trains; (3) require passengers to vacate space and accommodations on trains and (4) cancel reservations, space assignments or tickets for passengers when the movement of disabled military, naval or merchant marine personnel requires such action.

The order was issued on certification by the director of the Office of Defense Transportation that it is essential to the national defense and security that such priority be afforded to invalid, disabled or infirm members of the armed services of the United States or other nations allied with this government, with their attendants, en route to or from any point of hospitalization. In announcing the order, O.D.T. Director Johnson called attention to a letter written by him to J. J. Pelley, president of the Association of American Railroads, in which he pointed out that the commission order, based on the O.D.T. certificate, provided full legal support to the railroads in carrying out their plans to afford preferred service for the movement of casualties, as well as complete protection against any "unthinking opposition" that might be aroused by the execution of any or all of its terms.

Flexible Control Plan for Lumber

Blanket control covering all species of lumber under W. P. B. order L-335, amended and extended to the entire industry, became effective on August 1. The new controls cancel most of the present species restrictions on lumber and apply to all kinds of production except that of farmers from their own wood lots (these controls will be set up later by the War Food Administration). Lumber quotas for consumers will be assigned quarterly. The plan is flexible; it does not seek to bring supply and demand into exact balance, since that is impossible, but it is designed to adapt, as near as possible, the demand to the supply.

Accepted at its face value, the new plan promises equitable distribution of lumber, based upon the supply available. It places a "ceiling" on purchases; therefore, the problems connected with its operation will devolve largely upon the consumers of the various companies.

Santa Fe Employs Wards of Juvenile Court

A program has been launched by the Atchison, Topeka & Santa Fe in collaboration with Judge Samuel R. Blake, in charge of the juvenile department of the Superior court of Los Angeles county, Cal., and Mexican consular officials at Los Angeles to provide employment for wards of the Juvenile court. This experiment has been started with 50 Mexican boys serving as track laborers in an extra gang at Daggett, Cal. They will receive standard pay and all benefits of labor agreements. Each boy will receive one-half of his wages and the other half will be retained by the Juvenile probation officer in Los Angeles county, as trustee to be paid the boy or his parents, subject to court order, when the Juvenile court proceeding is terminated.

Responsible for the inauguration of this program, Judge Blake stated, "This is the first instance where a major corporation has shown a willingness to co-operate in the correction of juvenile delinquency, which is a problem of increasing civic and economic significance. It is hoped that the Santa Fe's lead in this most needed rehabilitation program will be followed by other industries throughout the country as a means of helping the courts to deal with and eventually reduce this distressing situation everywhere in the United States."

Army Railroaders Help Invasion Plan

The Army's Railway Military Service is taking a major part in the invasion of France, under the direction of Brig.-Gen. Clarence L. Burpee, according to recent dispatches from the headquarters of the European Theater of Operations. General Burpee is in charge of the initial organization of all U. S. Army railroad lines in the European continent. Starting from the first Allied terminal to rise again in the Cherbourg zone, the statement discloses, the United States Army railroad soldiers began to lay and rebuild tracks, operate and repair locomotives and cars and handle all rail movements of men and material to every fighting sector where the allies are in combat.

The railway forces for the Continental invasion have been designated the "Second Military Railway Service." Executive officer of the Second M. R. S. is Colonel Everette H. Qualls of Nashville, Tenn., formerly assistant director, Bureau of Motor Carriers, I. C. C. Major James W. Conway of Lakewood, Ohio, formerly with the Erie, is the administrative officer. Lieutenant Colonel G. J. Mulick, formerly general superintendent on the Union Pacific at Omaha, is in charge of the personnel of the operating and shop battalions which comprise this command. Lieutenant Colonel William T. Elmes, formerly division engineer on the New York Central, at Beaver Falls, Pa., is in charge of roadway maintenance, work equipment, and signaling. Colonel Sidney L. Bingham of the New York subway system is in charge of stores and procurement. Lieutenant Fay L. King of Sabula, Iowa, formerly with the C. M. St. P. & P., has charge of equipment maintenance.

Personal Mention

General

William D. Faucette, whose appointment as executive representative reporting to the receivers of the Seaboard Air Line, with headquarters at Norfolk, Va., was announced in the July issue, was born in Halifax, N.C. He graduated from North Carolina State College in 1901, and entered railroad service in that year as an assistant engineer in the Savannah, Ga., office of the Seaboard Air Line. In 1906 he was appointed an assistant engineer in the chief engineer's office, becoming chief clerk to the president in 1910. On January 1, 1913, Mr. Faucette was appointed chief engineer of the Seaboard Air Line System, including all subsidiary lines, the position he was holding when he was recently advanced to executive representative. In his new post, Mr. Faucette will be a member of the Seaboard's executive staff and will handle matters with various governmental authorities, both federal and in the states through which the Seaboard operates. Mr. Faucette has served as president of the American Railway Engineering Association.

William D. Faucette

Arthur D. Peters, whose promotion to assistant general manager of the New York, Chicago & St. Louis (Nickel Plate), with headquarters at Cleveland, Ohio, was reported in the June issue, was born at Springport, Mich., on November 19, 1879, and received his higher education at Michigan State college, graduating in civil engineering in 1903. During the following two years Mr. Peters served as an instructor in mathematics at Michigan State college, then entering the service of the Lake Shore & Michigan Southern (now part of the New York Central), as civil engineer. In 1909 he was appointed assistant engineer in the land department of the same company, and two years later he became land agent for the Lake Erie & Western (now part of the Nickel Plate), being appointed a special engineer on this road in 1913. Three years later he was advanced to division superintendent, and in November, 1936, he was promoted to the position he held at the time of his new appointment.

Oliver B. Keister, Jr., whose promotion to superintendent of the Mobile division of the Southern was reported in the June issue, was born at Knoxville, Tenn., on December 9, 1914, and graduated from the University of Tennessee in 1936. He entered railway service as a student apprentice with the Southern on July 15, 1936, and in July, 1937, he was promoted to assistant track supervisor of the Knoxville division, being advanced to assistant trainmaster of the Columbia division in October of the same year. On December 12, 1938, Mr. Keister was promoted to trainmaster with headquarters at Winston-Salem, N.C., and on February 21, 1941, he was transferred to Richmond, Va. On November 1 of the same year he was transferred to Charlottesville, Va., remaining in that location until his new appointment.

Engineering

G. K. Davis, special engineer on the Chesapeake & Ohio, has been promoted to the newly-created position of assistant to the chief engineer, with headquarters as before, at Richmond, Va.

Phillip R. Elfstrom, assistant chief engineer of the Chicago, Aurora & Elgin and the Chicago, North Shore & Milwaukee, has been promoted to general manager in charge of operations of the Aurora and has resigned from his position on the North Shore line.

A. B. Alexander, division engineer of the Canadian Pacific, has been promoted to district engineer of the Saskatchewan district with headquarters at Moose Jaw, Sask., succeeding C. H. Fox, who has been transferred to the Manitoba district, with headquarters at Winnipeg, Man.

P. C. Perry, division engineer on the Canadian National, with headquarters at Port Arthur, Ont., has been promoted to district engineer of the Saskatchewan district, with headquarters at Saskatoon, Sask., succeeding **A. M. MacGillivray,** who has retired.

E. R. Murphy, supervisor of track of Subdivision 9 of the Syracuse division of the New York Central, with headquarters at Syracuse, N.Y., has been appointed assistant division engineer of the Electric division, with headquarters at New York, to succeed **Clarence C. Lathey,** whose appointment as supervisor of track at Jersey Shore, Pa., was reported in the June issue.

G. C. Blackaller, master carpenter on the Denver & Rio Grande Western, with headquarters at Salt Lake City, Utah, has been promoted to division engineer on the Grand Junction division, with headquarters at Grand Junction, Colo., succeeding **A. L. Kleine,** who has been appointed roadmaster - trainmaster at Gunnison, Colo., a newly-created position.

George H. Fair, division engineer of the Tucson division of the Southern Pacific, with headquarters at Tucson, Ariz., has been transferred to the Salt Lake division with headquarters at Ogden, Utah, to succeed **Jack Stewart,** deceased, and has been succeeded by **T. W. Saul,** division engineer of the Sacramento division with headquarters at Sacramento, Calif., who in turn has been succeeded by **W. F. Turner.**

R. R. Burchett, division engineer of the Chicago division of the Chesapeake & Ohio, at Peru, Ind., has been transferred to the Huntington division, with headquarters at Huntington, W. Va., succeeding **C. B. Porter,** whose appointment as assistant chief engineer was reported in the July issue. **R. C. Watkins,** assistant division engineer of the Clifton Forge division, has been appointed division engineer of the Chicago division at Peru, succeeding Mr. Burchett.

W. P. Geiser, supervisor of track on the Pennsylvania, with headquarters at Olean, N.Y., has resigned to become assistant chief engineer of the Pittsburgh & Shawmut, with headquarters at Kittanning, Pa., and Brookville. Mr. Geiser obained his higher education at the University of Pittsburgh, graduating in 1925 with the degree of Civil Engineer. Early in his career Mr. Geiser served for a year with the U. S. Army Engineers in the canalization of the Allegheny river. He had been with the Pennsylvania since 1926, serving as rodman, assistant supervisor of track and supervisor of track.

H. L. McMullin, assistant engineer of water service on the Missouri Pacific, with headquarters at Houston, Tex., has been appointed engineer of water supply of the Texas & Pacific, with headquarters at Dallas, Tex. Mr. McMullin was born at New Boston, Mo., on January 7, 1895, and graduated from the University of Kansas in 1923. He entered railway service in that year as a water treating plant inspector of the Missouri-Kansas-Texas at Waco, Tex., and in July, 1924, he went with the Missouri Pacific as a chemist, with headquarters at Little Rock, Ark. On June 1, 1932, Mr. McMullin was transferred to Houston, and on August 1, 1942, he was promoted to engineer of water service, with headquarters at St. Louis, Mo. On March 1, 1944, he was appointed assistant engineer of water service, with headquarters at Houston.

James L. Kirby, chief engineer maintenance of way of the Seaboard Air Line at Norfolk, Va., whose retirement was announced in the July issue, was born in Richmond, Va., on August 28, 1883, and attended Ann Smith Academy and Roanoke College. In 1902 he entered railroad service with the Norfolk & Western, serving with preliminary location and construction parties until 1904, when he went with the Virginian to join a preliminary survey party for four months. In September of the same year he entered the employ of the Seaboard Air Line as an assistant engineer, re-

maining in this position until January, 1907, when he became engaged in dam construction. In June of that year he returned to his position as assistant engineer of the Seaboard, becoming division engineer in July, 1912, and engineer maintenance of way in July, 1918. Mr. Kirby had been serving as chief engineer maintenance of way since March, 1931.

E. Carl Shreve, division engineer on the Western Maryland, with headquarters at Cumberland, Md., has been promoted to engineer maintenance of way, with head-

E. Carl Shreve

quarters at Hillen station, Baltimore, Md. Mr. Shreve graduated in civil engineering from Ohio State University in 1928 and entered railroad service on June 10, 1940, as an assistant engineer on the Western Maryland at Baltimore, being promoted to assistant division engineer at Hagerstown, Md., in August of that year. He was promoted to division engineer at Cumberland, on September 15, 1942, the position he held at the time of his recent promotion. Prior to entering railroad service Mr. Shreve had been employed with the U. S. Geological Survey, and the West Virginia State Road Commission. He also served for a time as head of the engineering department of the Potomac State School of West Virginia University.

W. D. Simpson, whose appointment as chief engineer of the Seaboard Air Line, with headquarters at Norfolk, Va., was reported in the July issue of *Railway Engineering and Maintenance,* was born on February 12, 1890, at Raleigh, N.C., and graduated from North Carolina State College in 1913. He entered railroad service on February 1, 1916, as a draftsman in the office of the chief engineer of the Seaboard Air Line, and in August, 1917, he became bridge draftsman. From October, 1917, to February, 1919, he served as a 1st lieutenant of the U. S. Army Air Corps, returning to the Seaboard as a bridge draftsman upon being released from the Army. Mr. Simpson was promoted to chief draftsman in the office of the chief engineer in March, 1919, becoming assistant division engineer in the maintenance department at Jacksonville, Fla., in October, 1920, and advancing to division engineer at Tampa, Fla., in February, 1921, and to district engineer maintenance of way in October, 1924. Mr. Simpson served as assistant engineer maintenance of way at Norfolk, from March, 1926, to December, 1940, when he was promoted to assistant chief engineer

W. D. Simpson

maintenance of way, the position he was holding at the time of his recent promotion to chief engineer.

Joseph R. Leguenec, Jr., supervisor of bridges and buildings on the St. Louis Southwestern, with headquarters at Tyler, Tex., has been promoted to division engineer of the Texas division, with the same headquarters. Mr. Leguenec was born at Abbeville, La., on August 25, 1893, and graduated from the State College of North Carolina in June, 1915. In February, 1916, he entered railway service as a computer of the Gulf, Colorado & Santa Fe, later serving as a transitman at various points on that road. In 1918 and 1919 he served with the U. S. Army, returning to the G. C. & S. F. as a transitman. In May, 1920, Mr. Leguenec went with the St. Louis Southwestern as a

Joseph R. Leguenec, Jr.

transitman at Tyler, and one year later he was advanced to assistant division engineer, with the same headquarters. On January 1, 1923, he was promoted to roadmaster, with headquarters at Waco, Tex., and five years later he was further promoted to resident engineer, with headquarters at Tyler. In January, 1931, he was appointed assistant division engineer, with headquarters at Mt. Pleasant, Tex., and in April, 1942, he was promoted to the position he held at the time of his new appointment.

Frank J. Jerome, chief engineer of the New York Central System west of Buffalo, including the Michigan Central and the Cleveland, Cincinnati, Chicago & St. Louis (Big Four), with headquarters at Chicago, has also been appointed chief engineer of the Indiana Harbor Belt, the Chicago Junction and the Chicago River & Indiana, with the same headquarters, succeeding **Otto Gersbach,** who has retired after 54 years service.

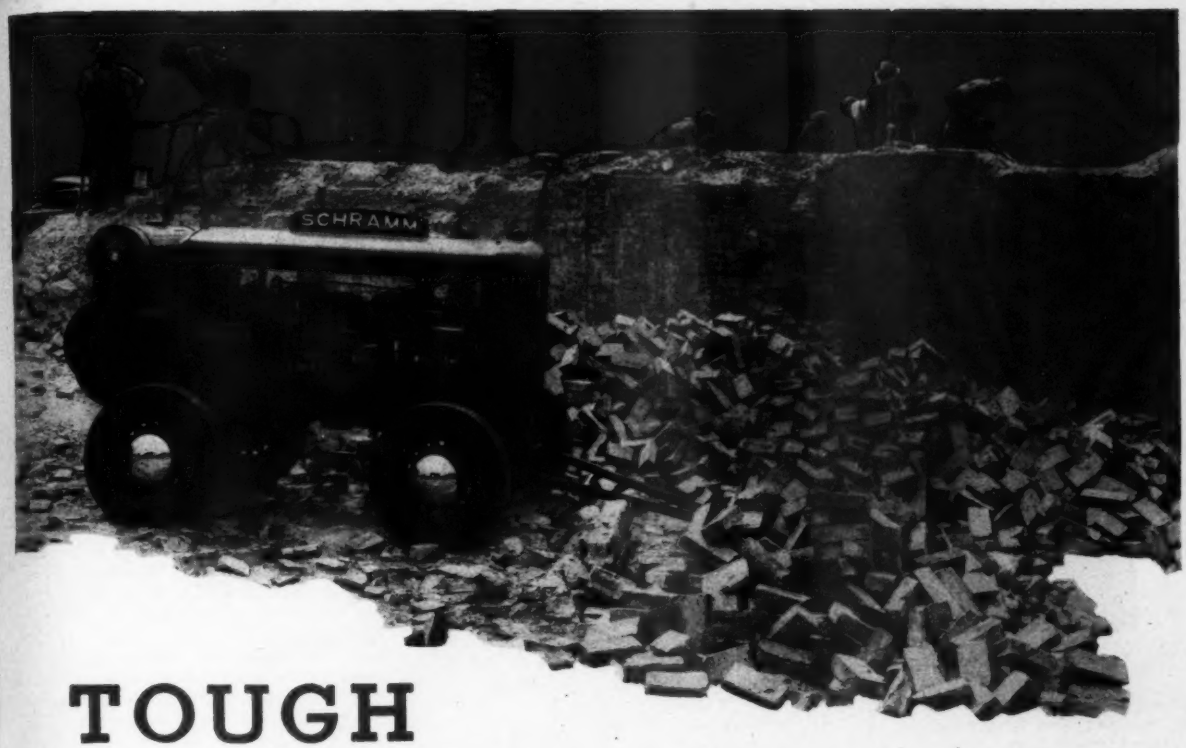
Mr. Gersbach was born at Montezuma, Iowa, on August 24, 1876, and graduated from Iowa State College in 1897. He entered railway service in the same year with the Iowa Central (now the Minneapolis & St. Louis), and in 1902 he went with the Indiana Harbor (now the Indiana Harbor Belt), in charge of track elevation. In 1907 Mr. Gersbach went with the Indiana & Southern (now part of the New York Central), on the construction of bridges on the Kankakee division, with headquarters at Chicago, and three years later he became engineer maintenance of way of the Indiana Harbor Belt. In 1918 he was promoted to chief engineer, with headquarters at Gibson, Ind., and in 1922 he was also appointed chief engineer of the Chicago Junction and the Chicago River & Indiana, with headquarters at Chicago. From February, 1933, to November, 1937, Mr. Gersbach served also as chief engineer of the Western division of the New York Central, and the West division of the Michigan Central.

Howard C. Forman, division engineer on the Louisville & Nashville at Ravenna, Ky., has been advanced to assistant engineer in the chief engineer's office, with headquarters at Louisville, Ky., succeeding **G. H. Beasley,** whose promotion to principal assistant engineer, with headquarters at Louisville, was reported in the July issue. **Walter E. Quinn,** assistant engineer in the chief engineer's office, has been appointed assistant division engineer of the Birmingham division, with headquarters at Birmingham, Ala., replacing **John U. Estes,** who has been promoted to division engineer at Ravenna, succeeding Mr. Forman. **Alex Manson,** draftsman in the office of the chief engineer at Louisville, has been advanced to assistant engineer on the Louisville division, relieving **Jack Small,** who has been promoted to assistant engineer in the chief engineer's office. **James K. Gloster,** assistant engineer in the chief engineer's office, retains the same title, but succeeds to the duties of Mr. Quinn.

Mr. Estes was born at Sharon, Tenn., on October 1, 1896, and graduated from the University of Tennessee in 1918. He entered railway service in December, 1920, as an instrumentman on the Louisville & Nashville at Ravenna, and in 1922 he was promoted to draftsman in the chief engineer's office. In 1938 Mr. Estes was advanced to assistant supervisor of bridges and buildings, with headquarters at Birmingham, Ala., and on October 1, 1943, he was promoted to the position he held at the time of his new appointment.

A biographical sketch of Mr. Forman

(Continued on page 728)



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Merely by easily moving a Schramm Air Compressor onto the job—and touching a starter button—you get all the compressed air you want—and your construction job becomes a cinch!

On the one hand, Schramm Compressors are rugged, tough "babies"... on the other, lightweight and compact so they can be towed to any job. This means: no job is too tough—and you get air anywhere you want it!

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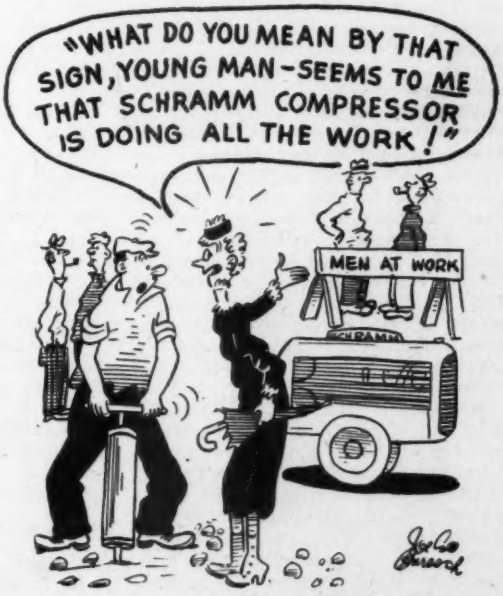

SCHRAMM INC.

THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA

appeared in the January, 1944, issue of *Railway Engineering and Maintenance* at the time his promotion to division engineer at Ravenna was reported.

Horace W. Flemming, assistant district engineer of the Canadian National, with headquarters at Montreal, Que., has been promoted to district engineer of the North Ontario district, with headquarters at

Horace W. Flemming

North Bay, Ont., succeeding **Charles H. N. Connell,** who has retired.

Mr. Flemming was born at Liverpool, N.S. Beginning his railroad career in 1909 at Colbourne, Ont., as a rodman for the Canadian National, Mr. Flemming went to St. Prime, Ont., the following year, as resident engineer. He then served as transitman at Toronto, Ont., and Ottawa, and, from 1911 to 1919, as resident engineer of the James Bay & Eastern, Toronto-Hamilton, Toronto-Ottawa, and Hawkesbury-Montreal districts, successively. In 1919 he became engineer in charge of the Ontario and Quebec lines of the Canadian National, being appointed resident engineer of the St. Lawrence district in 1920, and assistant engineer of that district the next year. He acted in a similar capacity at Toronto, Ottawa, and Hornepayne, Ont., until May, 1923, when he was named inspecting engineer at Toronto. In October, 1925, Mr. Flemming became division engineer at Hornepayne. He moved to Montreal in March, 1928, as assistant district engineer, maintaining that post until his recent promotion.

Mr. Connell was born at Woodstock, N.B., and entered railroading in 1897 in the office of the division engineer, Crow's Nest Pass (now part of Canadian Pacific). In 1899 he became topographer on survey with the Ontario & Rainy River, and in 1900 joined the Algoma Central & Hudson Bay as rodman and resident engineer. Two years later he went to Liverpool, N.S., as instrumentman on construction with the Halifax & South Western (now part of Canadian National), and in 1903 moved to Lethbridge, Alta., as engineer maintenance of way and chief engineer of the Alberta Railway and Irrigation Company. Mr. Connell was appointed district engineer of the Canadian National in 1909, at Quebec, serving in a like capacity at Toronto from January, 1921, to September, 1925, when he became assistant district engineer of the Northern Ontario district with headquarters at North Bay. This post he held until his recent retirement.

Track

R. T. Holbrook, an instrumentman on the Louisville & Nashville, has been promoted to track supervisor, with headquarters at Whitesburg, Ky., a newly-created position.

T. Rafter, roadmaster on the Canadian National, with headquarters at Gillam, Man., has retired after 44 years service. Mr. Rafter was born at Arnprior, Ont., in 1871, and entered railway service in 1900 with a bridge and building gang of the Canadian National. He held several minor positions at various points of the road until 1926 when he was promoted to bridge and building supervisor, and in 1934, following an accident in which he was seriously injured, he was appointed to the position he held at the time of his retirement.

W. DeVries, assistant supervisor of track of Subdivision 10 of the Syracuse division of the New York Central, with headquarters at Lyons, N.Y., has been promoted to supervisor of track of Subdivision 18 of the St. Lawrence division, with headquarters at Gouverneur, N.Y., to succeed **D. W. Johnston,** who has been transferred to Subdivision 9 of the Syracuse division, with headquarters at Syracuse, N.Y., to succeed **E. R. Murphy,** whose appointment as assistant division engineer is noted elsewhere in these columns. **G. W. Bennett,** a work-train foreman, with headquarters at West Albany, N.Y., has been promoted to assistant supervisor of track at Lyons, to succeed Mr. DeVries.

Julian L. Porter, assistant roadmaster on the Norfolk & Western, has been promoted to roadmaster of District 4 of the Norfolk division, with headquarters at Lynchburg, Va., succeeding **H. S. Shanklin,** deceased. Mr. Porter was born on April 25, 1913, at Flat Top, Va., and received his higher education at Marshall College, graduating in 1932. He entered railway service with the Norfolk & Western in June, 1933, serving successively as water boy, track laborer, welder helper, ditcher fireman, assistant foreman of extra gangs, relief section foreman, section foreman, and inspector of costs in the office of the manager of roadway maintenance. In 1942 he was advanced to assistant roadmaster, which position he held until his recent promotion.

Obituary

H. S. Meily, who retired in 1928 as division engineer on the Tyrone division of the Pennsylvania, died at Wilkes-Barre, Pa., on June 9.

Henry W. Fenno, who retired in 1940 as engineer maintenance of way of the New York Central, Lines West of Buffalo, with headquarters at Cleveland, Ohio, died at that city on June 27. Mr. Fenno was born at Dorchester, Mass., on December 16, 1870, and was educated at Lowell Institute at Boston, Mass. He entered railway service in November, 1891, in the engineering department of the New York and New England (now a part of the New York, New Haven & Hartford). From January, 1893, to October, 1904, he was in the service of the Boston & Albany. In October, 1904, Mr. Fenno was appointed chief draftsman and office engineer on the Lake Shore & Michigan Southern (now a part of the New York Central) and in 1906 he was promoted to resident engineer of the Eastern division, with headquarters at Dunkirk, N.Y. In February, 1913, he was transferred to the Western division, with headquarters at Chicago, and in March, 1916, the Illinois division was added to his territory. He was promoted to division engineer in 1917. On November 1, 1927, he was advanced to the position he held at the time of his retirement.

Roy A. Brown, division engineer on the Chicago, Rock Island & Pacific, whose death on April 7 was reported in the May issue, was born at Rockford, Mich., on February 15, 1902, and graduated from the University of Michigan in 1924. He entered railway service on July 1, 1924, as a rodman in the engineering department of the Rock Island, and on March 1, 1926, he was promoted to instrumentman at Trenton, Mo. On October 1, 1927, he was appointed resident engineer and served on the construction of various line changes and grade revisions on the Missouri and Illinois divisions. On May 1, 1930, Mr. Brown was promoted to division engineer, with headquarters at Cedar Rapids, Iowa, and several months later he was appointed roadmaster at Goodland, Kan. From December 1, 1930, to August 1, 1931, he served as an instrumentman at Fairbury, Neb., and Trenton, and on the latter date he was appointed track supervisor at La Salle, Ill., later serving in that capacity at various points, until May, 1936, when he was promoted to roadmaster, with headquarters at Cedar Rapids, Iowa. He was later transferred to Manly, Iowa, and in March, 1939, he was appointed acting division engineer, with headquarters at Fairbury. On January 1, 1940, he was advanced to the position he held at the time of his death.

Industrial Jack Catalogue.—Featuring its Simplex lever, screw and hydraulic industrial jacks, Templeton, Kenly & Co., Chicago, has published a 60-page booklet. The booklet contains descriptions, dimensions and weights of hundreds of jacks ranging from 3-ton to 100-ton capacities; it also includes operating and maintenance instructions on all types of jacks. The various jacks are listed by types for ready reference.

Brochure Features Tournapull Unit.—A six-page brochure describing and illustrating the new Model D Tournapull earth mover has been published by R. G. Le Tourneau, Inc., Peoria, Ill. Several pictures illustrate the many uses to which the unit may be put and show the Tournapull in actual operation as a scraper, crane, earth mover and spreader, being used to fill both civilian and military needs.

(Continued on page 730)

TIMKEN BEARINGS

Fairbanks-Morse No. 57 Motor Car equipped with Timken Bearings on all axles.

keep busy inspection cars rolling

The greatest value of Timken Tapered Roller Bearings in section motor cars and trailers, lies in their ability to carry radial, thrust and combined loads; to maintain wheel gauge and alignment; to protect axles against wear; and to reduce wheel breakage. These advantages greatly increase car endurance and availability for service.

At the same time, the elimination of friction assures a higher speed potential, simplifies lubrication and saves lubricant.

When buying motor cars of any kind it will pay you to limit your range of selection to makes that are Timken Bearing Equipped; for no matter how good any piece of equipment may be *without* Timken Bearings, you cannot afford to overlook the plus value you get with them. The Timken Roller Bearing Company, Canton 6, Ohio.

Association News

Wood Preservers' Association

The executive committee of the association held a meeting in Cincinnati, Ohio, on July 12.

Maintenance of Way Club of Chicago

To formulate preliminary plans for the 1944-45 season of the club, the officers and directors held a meeting in Chicago on July 26. At this meeting President W. S. Lacher appointed the standing committees for the ensuing year, consideration was given to the types of programs to be presented, and it was decided to make a specific effort to interest bridge and building officers in the Chicago area in becoming members.

Bridge and Building Association

President J. L. Varker has called a meeting of the officers and directors of the association in Chicago on August 21 to review the status of committee work, to pass upon applications for membership, and to take up other association matters that may require attention at that time. Many unavoidable difficulties have held up the publication of the 1943 Proceedings of the association, but work on them is rapidly drawing to a close, with the hope that copies can be sent to members late in August.

Roadmasters' Association

Upon a call by President E. L. Banion, the Executive committee will meet in Chicago on August 14, with its primary business the reviewing of the technical reports which have been prepared by committees, and to consider the character and scope of the activities of the association this fall. The 1943 proceedings of the association, long delayed by conditions beyond the control of the Proceedings committee, are now in the hands of the bindery, and every effort is being made to get them into the hands of members as soon as possible.

American Railway Engineering Association

Following the large number of committee meetings that were held in June, no meetings of association committees were held in July and none is scheduled during August at the time this announcement goes to press.

Late in July, the June-July bulletin was mailed to members, this bulletin including a number of items of special interest, including a monograph on Conversion and Reclamation of Material for Maintenance of Way, by R. P. Winton, welding engineer, Norfolk & Western; a monograph on Experience With Corrugated Rails in Australia, by G. E. Cowdery, inspecting engineer of welded track, New South Wales Railways; a monograph on Steam Contamination by Aquaglobejection, by R. W. Seniff, engineer of tests, Alton; an index of material in previous association proceedings on Railway Water Service, by C. R. Knowles, superintendent of water service (retired), Illinois Central, and now associate editor, *Railway Engineering and Maintenance Cyclopedia;* and the preliminary report of the Committee on Ties dealing with tie renewals and cost of such renewals per mile of maintained track, in the United States and Canada, in 1943.

Unavoidable delays in the bindery have continued to hold up the 1944 proceedings of the association and the Annual Supplement to the Manual, but it is now anticipated that copies of the proceedings will be mailed to the members early in August, to be followed shortly by the Manual material.

Supply Trade News

General

The **Independent Pneumatic Tool Company,** Aurora, Ill., has been granted a third renewal of its Army-Navy "E" award.

The name of the **American-Terry Derrick Company,** South Kearny, N.J., has been changed to **American Hoist & Derrick Co.,** Plant No. 2, South Kearny.

The **Houdaille-Hershey Corporation** has purchased all of the stock of the **Honan-Crane Corporation,** manufacturer of oil purification equipment, which will be operated as a subsidiary.

Personal

Ed. R. Galvin has resigned as general sales manager of **R. G. LeTourneau, Inc.,** Peoria, Ill., to become president and a director of the **Tyson Bearing Corporation,** Massillon, Ohio. Mr. Galvin was appointed a district representative of the Caterpillar Tractor Company, Peoria, in 1927, and later served that organization as eastern sales manager and as general sales manager.

H. H. Fuller, New York district sales manager, has been elected vice-president in charge of west coast steel activities of the **Bethlehem Steel Company** to succeed **W. H. Stewart,** who is retiring from active duty but will continue in an advisory and consulting capacity. **C. M. Mackall,** general manager, central sales at Pittsburgh, Pa., will succeed Mr. Fuller as manager of sales, New York district and **Bennett C. Macgregor,** formerly manager of sales, St. Louis, Mo., district, will succeed Mr. Mackall as general manager, central sales. **C. H. Cecil,** a member of the sales force in the Chicago district, has been appointed manager of sales.

Gordon S. McKenty has been appointed general sales manager of **R. G. LeTourneau, Inc.,** Peoria, Ill., to succeed **Ed. R. Galvin,** who has resigned to become president and a director of the Tyson Bearing Corporation, Massillon, Ohio. Mr. McKenty graduated from the University of Nebraska in 1924 and subsequently served as an engineer in Mexico and China for the International Telephone & Telegraph

Gordon S. McKenty

Co., later serving in construction equipment sales in Nebraska for five years prior to joining LeTourneau in 1935. With LeTourneau, Mr. McKenty began as a district sales representative, serving in a score of middle western and eastern states. From 1941 to 1943 he managed and expedited $8,000,000 in War Department shell contracts fulfilled by LeTourneau plants at Toccoa, Ga., and Vicksburg, Miss. In 1943 he started a reorganization of LeTourneau's parts shipping organization.

Obituary

H. Edward Manville, Sr., former chairman of the board of the Johns-Manville Corporation, died on June 27. He was 72 years of age.

Leslie Flood, eastern sales representative of the Oxweld Railroad Service Company in New York, died on June 14. He was 54 years of age. Mr. Flood was graduated from Cornell University in 1912. After working as a civil engineer on municipal projects in Chicago, he served as a lieutenant in the United States army engineers in France in 1917 and 1918. Upon his return he joined the sales department of the Oxweld Railroad Service Company, a unit of Union Carbide & Carbon Corporation, and during recent years covered the New England and Middle Atlantic territory.

Col. Warren R. Roberts, co-founder and president of the Roberts & Schaefer Company, Chicago, from 1904 to 1926, died in Miami, Fla., on June 22. Col. Roberts was born in Sadorus, Champaign County, Ill., on October 20, 1863, and graduated from the University of Illinois in 1888. He engaged in general engineering practice from 1888 to 1891 and was engineer of bridges of the city of Chicago from 1893 to 1894. For the next nine years he engaged in general engineering and contracting and in 1904 became president of the Roberts and Schaefer Company. In 1926, he was elected chairman of the board, which position he held until his retirement in 1934.

HOT . . . but not bothered

And when we say "hot", we mean 120° in the shade . . . and of course, much hotter inside the gasoline engine of a Homelite Portable Generator. But there's no question of "burning up" . . . for the engine is air-cooled. There's no radiator to boil over or run dry.

A large fan on the flywheel sends a constant blast of air over the cylinder. Shields direct this air across the fins of the aluminum cylinder . . . providing maximum cooling. Complete lubrication is assured . . . for oil is mixed with the gasoline and sprayed under pressure into all moving parts. No sludge . . . no dirty oil . . . for a fresh, clean film of oil enters the crankcase with each revolution.

And the most interesting thing is this . . . the means of protecting a Homelite from heat, is also the means of protecting it from cold. There's no radiator to freeze. And lubrication is the same hot or cold . . . for oil mixed with gasoline won't congeal, even at sub-zero temperatures.

From broiling tropical heat down to sub-zero arctic temperatures, a Homelite performs without trouble. The performance of thousands of Homelites with the armed forces everywhere has proved this point *plenty*.

Railroads have maintenance troubles all through the year . . . the hottest days in summer and the coldest days in winter. And as your men must work so must your equipment.

For doing this work fast . . . with portable electric tools . . . or for doing emergency work at night . . . you can depend on a Homelite Portable Gasoline-Engine-Driven Generator for your power supply . . . rain or shine . . . hot or cold.

HOMELITE CORPORATION

PORT CHESTER, NEW YORK

When traveling is difficult

Railway Engineering and Maintenance Will Make Your Call Every Month

A Cure for that Guilty Feeling

"Boss, every time I ride a train now days I feel guilty," commented the star salesman to his railway sales manager.

"How's that, Bill?" inquired the sales manager.

"Because I feel that I'm taking a seat from a boy hurrying home for a short furlough before shoving off or from his sweetheart or mother who wants to see him before he sails."

"That's what Director Johnson of the O.D.T. is calling attention to almost every day. Stay off the trains and make room for essential travel, he says."

"And he's right. But how are we going to keep our products before our railway friends if we don't call on 'em?"

"The only way I know is to increase our advertising in *Railway Engineering and Maintenance*. We can reach 'em that way."

"You've got something there, Boss, for that magazine will find them whether they are in the office or on the line and that's more than I can do with a lot of them these days."

"And we can get our story before those who are located in out of the way places that you never get to."

"That's true, too."

"I'll increase our space, in order to tell our story in print, beginning with the next issue."

"It'll certainly beat traveling in these days—and I'm sure it will do the job better than I can do it under present conditions."

RAILWAY ENGINEERING AND MAINTENANCE IS READ BY MAINTENANCE OFFICERS OF ALL RANKS

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OILY WASTE CAN

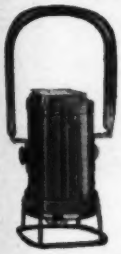
A *Square* deal for the roundhouse

Protecting vital tools, equipment, supplies, and even roundhouses from fires is all in a day's work for the Justrite Oily Waste Can. It offers protection against fire . . . reduces the chance of fires even starting.

The Justrite Oily Waste Can is available in four sizes. The approvals of Underwriters' Laboratories, Inc., and the Associated Factory Mutual Fire Insurance Companies are your assurance that when Justrite is on the job for you . . . safety is right there too.

Made by the makers of . . .

THE JUSTRITE TWIN-BULB TRAINMEN'S LANTERN



This lantern is a favorite with trainmen everywhere because it gives the kind of light trainmen *must* have . . . a steady, powerful, smoke and fog piercing beam with the light to the sides from the same bulb at the same time. The twin-bulb feature in Justrite lanterns protects trainmen from the hazards of light failure.

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JUSTRITE *Safety Products*
SAFETY CANS · FILLING CANS · OILY WASTE CANS
APPROVED SAFETY ELECTRIC LANTERNS

a Breather

FOR HOT PLANES AND MEN

Heat — 140 degrees, and more — maintenance crews in plane interiors, oven hot. Portable ventilating units, powered by gasoline engines, bring relief — draw hot air out, or shoot cool air in — one more war job for dependable Briggs & Stratton 4-cycle air-cooled gasoline engines.

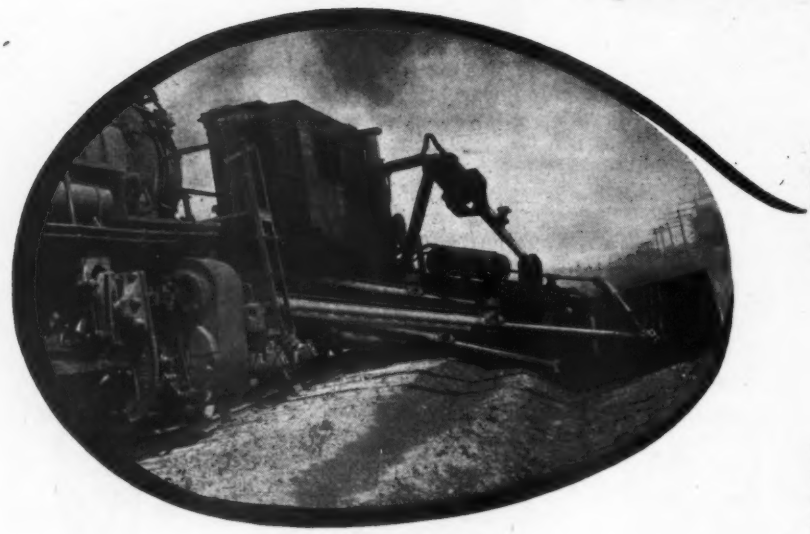
Air-Cooled Power

4 CYCLE BRIGGS & STRATTON GASOLINE ENGINES

During 25 years of *continuous* production Briggs & Stratton has built more than 2,000,000 air-cooled 4-cycle gasoline engines. We are well started on the 3rd million. Trouble-free performance, easy starting and economy have made Briggs & Stratton leaders in the field — and "preferred power" everywhere. BRIGGS & STRATTON CORP., Milwaukee 1, Wis., U.S.A.

Composite Spreader-Ditcher

by JORDAN



Does the work of an army of men!

The Jordan Composite Spreader-Ditcher does a multiple job for you with less labor.

It—

- Contours ballast
- Shapes ballast
- Levels berm
- Cuts side drainage ditch
- Cuts foul ballast away from end of ties

Speed up your ditching and roadbed shaping, on both sides, to 20 miles a day with the Jordan Composite Ditcher-Spreader.

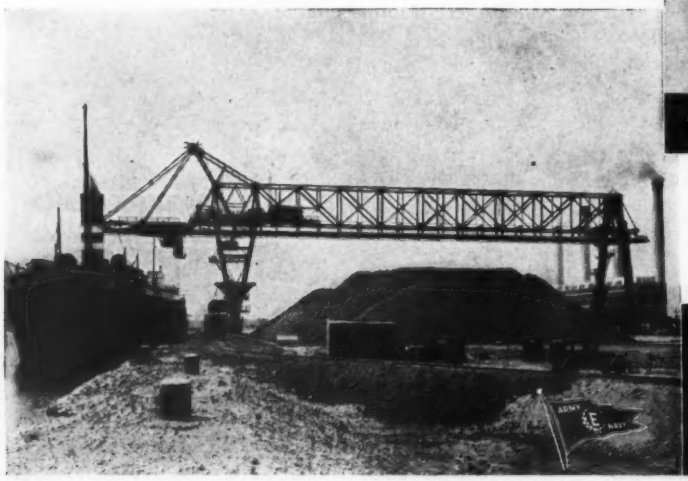
O. F. JORDAN COMPANY EAST CHICAGO INDIANA

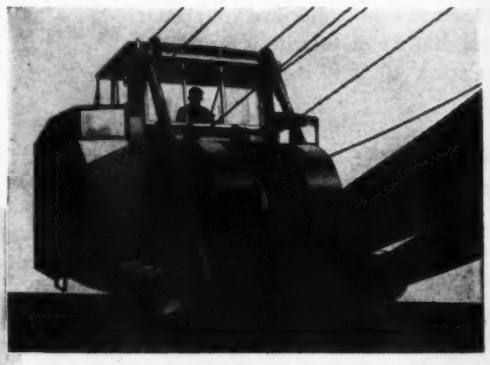
Walter J. Riley, *President*

If it's heavy material handling equipment you need,

INDUSTRIAL BROWNHOIST knows how to design and build it.

Here at Industrial Brownhoist we design and build some of the world's largest equipment for the efficient handling of heavy materials, as well as the well-known Industrial Brownhoist locomotive cranes. • The Coal-Handling Bridge below is typical. With a 300 ft. span and a raisable apron extending 110 feet out overall, this crane transfers coal from boats to cars and storage piles.





Above: Industrial Brownhoist gas or Diesel locomotive Cranes, from 20 to 50 tons, are well-known for their ability to stand up under constant use. Monitor-type cabs give 360° visibility, increase operator efficiency.

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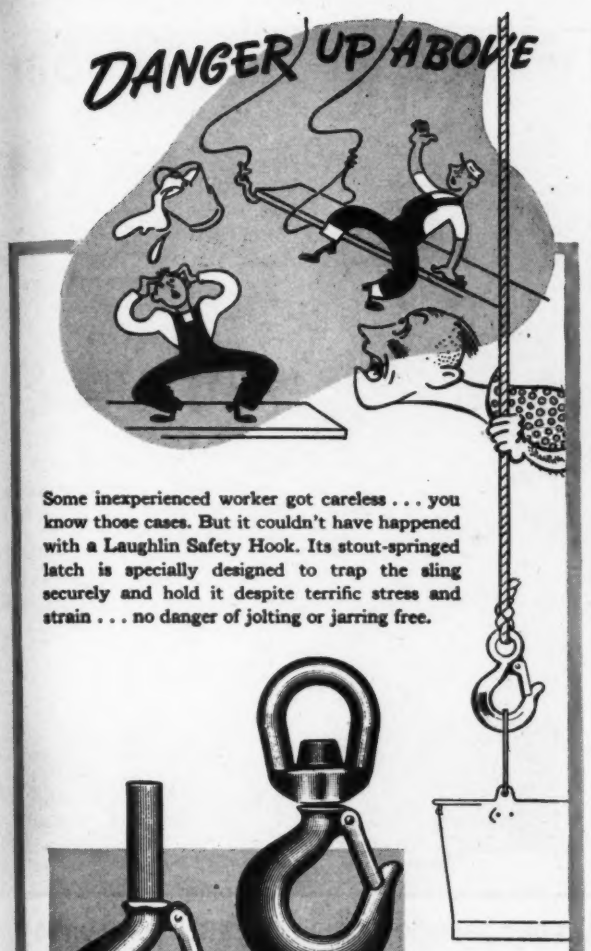
BAY CITY, MICHIGAN • District Offices: New York, Philadelphia, Cleveland, Pittsburgh, Chicago • Agencies: Detroit, Birmingham, Houston, Denver, Los Angeles, San Francisco, Seattle, Vancouver, B. C., Winnipeg, Manitoba, Canadian Brownhoist, Ltd., Montreal, Quebec.



Some inexperienced worker got careless . . . you know those cases. But it couldn't have happened with a Laughlin Safety Hook. Its stout-springed latch is specially designed to trap the sling securely and hold it despite terrific stress and strain . . . no danger of jolting or jarring free.

These safety hooks are made of selected, heat-treated steel . . . galvanized or plain finish.

Laughlin offers you the most complete line of hoist hooks on the market in the most varied choice of foolproof safety designs. They give added protection in these days of faster schedules and fewer skilled workers.

Laughlin's complete line of wire rope fittings is distributed through Mill Supply Houses. Send for a catalog today.

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PORTLAND 6, MAINE

POWER
For The Big Jobs

BALANCED
For Use In Any Position

STANLEY W9 ELECTRIC SAW

W9 Safety Saw cuts full 3¼" deep – plenty of power. Well-balanced for light work too. It's practically a jack-of-all-trades for any sawing on the job. Knocks hours from slow, expensive hand sawing. Can be driven from a small portable generator, or plugged in any light socket. Ask your Stanley distributor for demonstration, or write for literature. Stanley Electric Tool Division, The Stanley Works, 160 Elm St., New Britain, Conn.

STANLEY

BURRO GETS THE WORK DONE FAST, ECONOMICALLY AND HANDLES EASILY

No Burro operator needs to be told how easily a Burro Crane handles—or how many crane-hours a day it can put in—or how many different jobs it can do under all sorts of conditions.

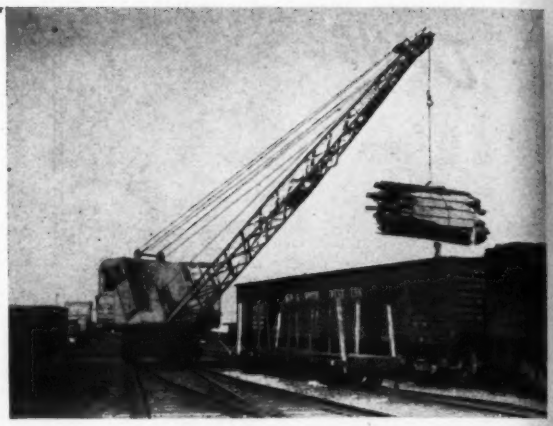
He knows it and we know it—we, because we designed and built Burro to tackle all the railroad jobs we could make a crane do—he, because he has *used* burro on all the jobs he is called on to do.

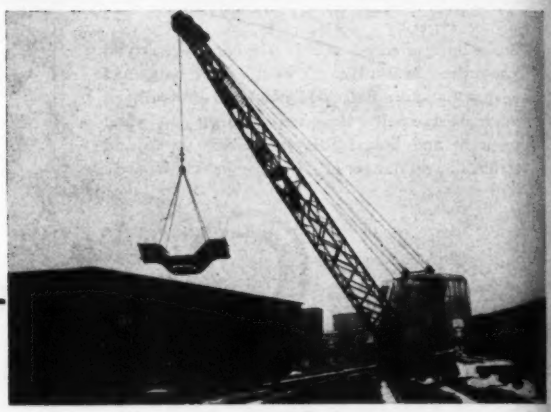
But do *you* know how the versatile, adaptable Burro can lighten *your* work—do it faster—save valuable equipment time—by eliminating many locomotive and work-train hours—how Burro can save you time—save you operating expense?

BURRO

CRANES

Ask us for Bulletins F-100 and F-110 or write us outlining your requirements.





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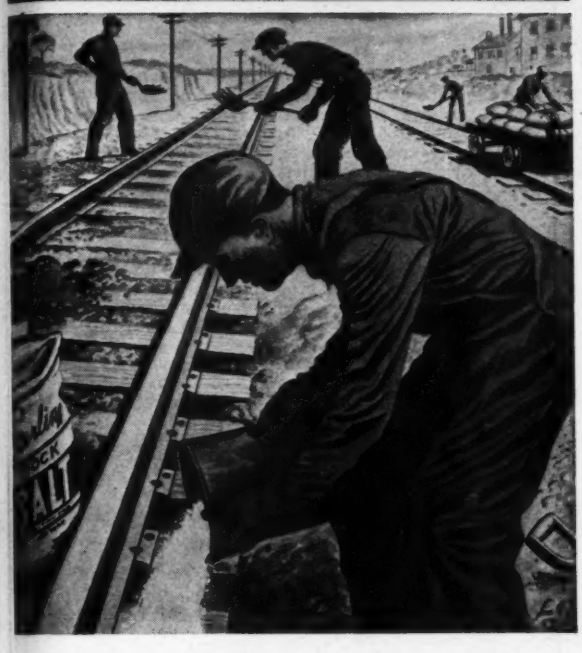

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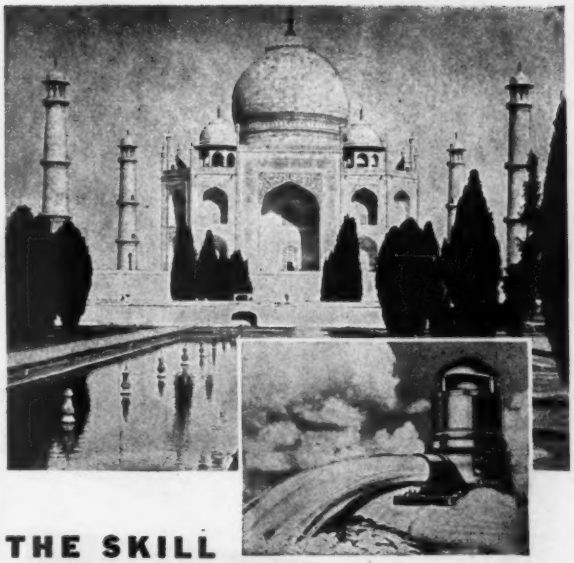

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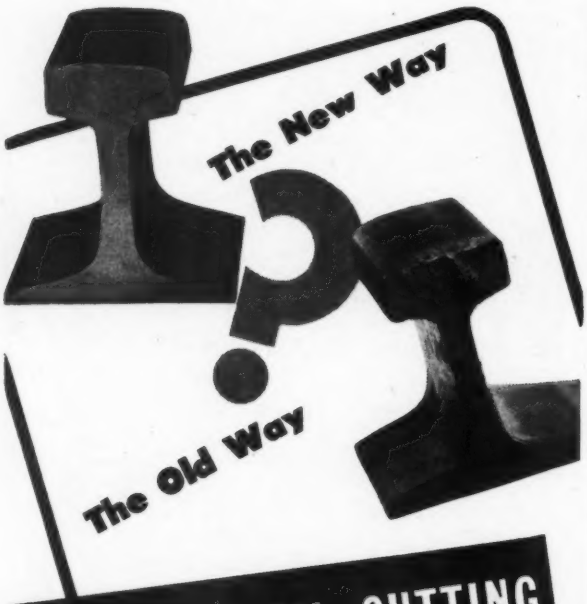

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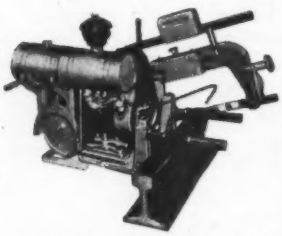

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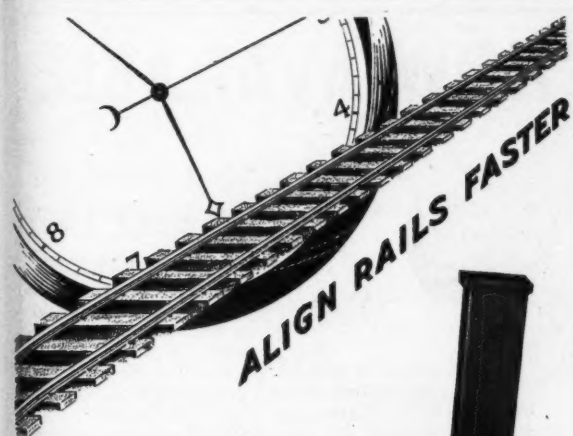

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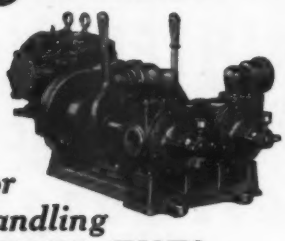

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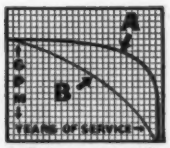

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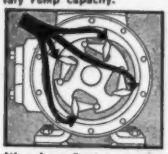

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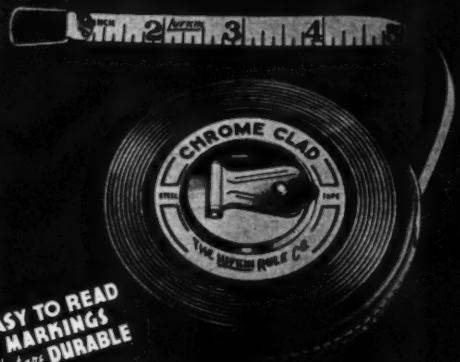

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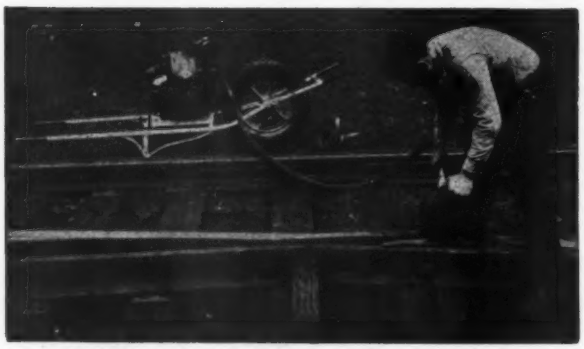

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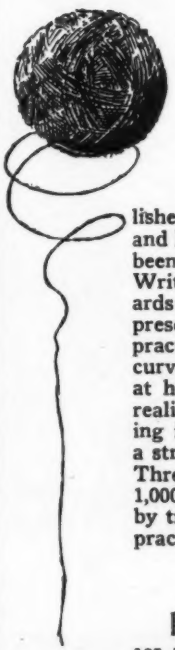

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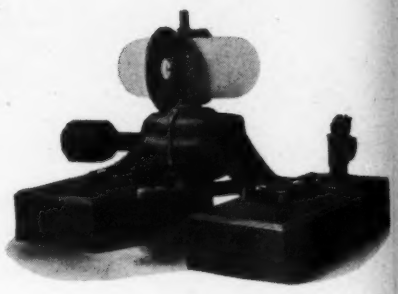

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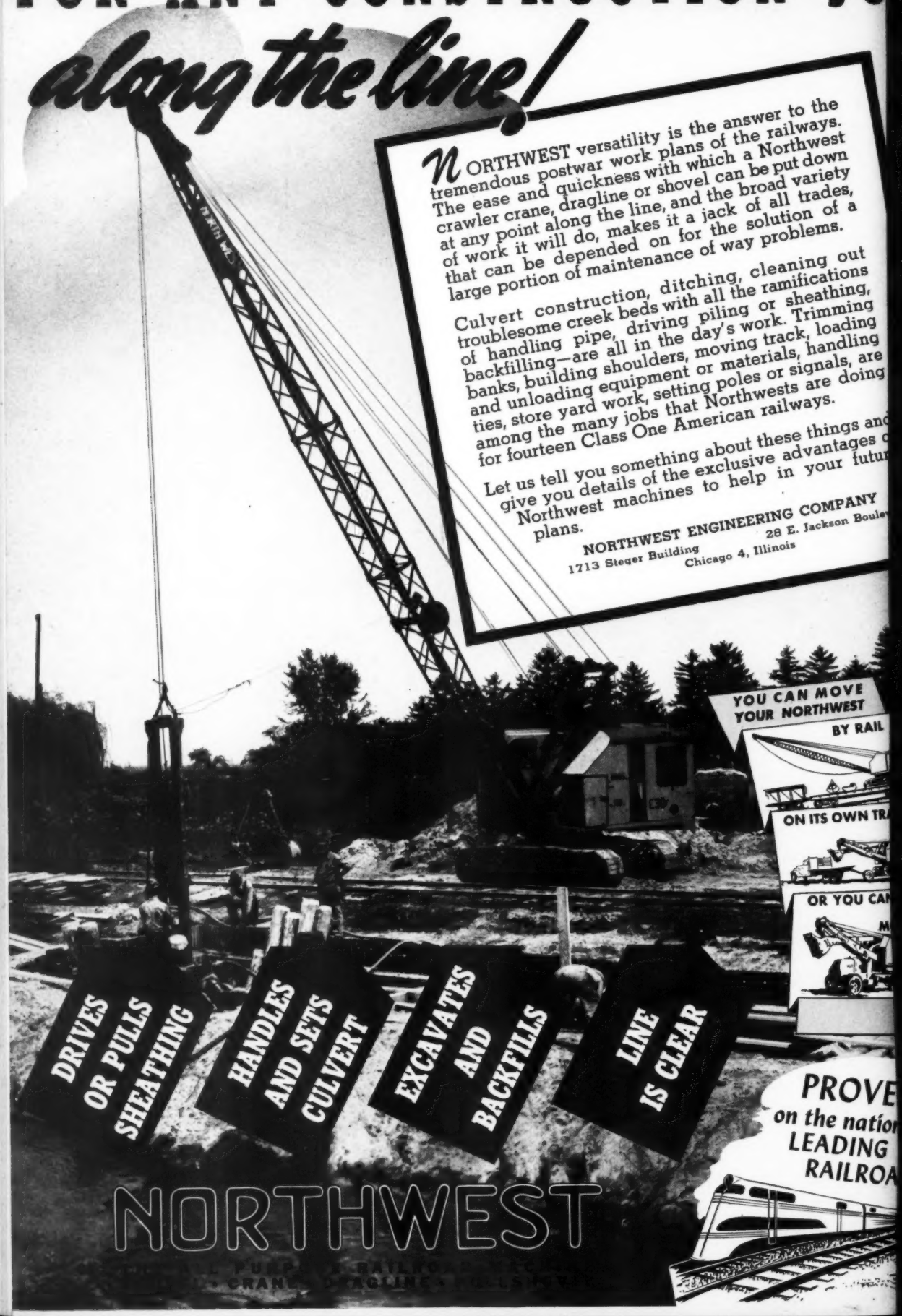
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